

**NUTRITION
AND
DEVELOPMENT
SERIES No. 8**



Satisfying Hidden Hunger

Addressing Micronutrient Deficiencies in Central Asia

Asian Development Bank



Satisfying Hidden Hunger

Addressing Micronutrient Deficiencies in Central Asia

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Foreword

Malnutrition and micronutrient deficiencies are causes and a consequence of poverty. The consequences of chronic malnutrition and micronutrient deficiencies, beginning with women and their young children, are intergenerational and account for a large proportion of child and maternal deaths, mental disability, and less productivity of the workforce.

The Asian Development Bank (ADB), in partnership with the United Nations Children's Fund (UNICEF) and the International Food Policy Research Institute, conducted a comprehensive assessment of nutrition in Asia in the last decade. It determined that food fortification is one of the most cost-effective strategies that can lift the tremendous human and economic burden of micronutrient deficiencies and malnutrition in Asia.

The beginning of ADB's active involvement in nutrition in 1999 led to a series of studies and a landmark conference, *Strategies to Fortify Essential Foods in Asia and the Pacific* (Manila Forum 2000), the reports of which were published by ADB in its *Nutrition and Development Series*. The studies led to projects in Central Asia and Mongolia, Indonesia, Nepal, and Viet Nam.

During 2001–2007, ADB led an initiative in Central Asia and Mongolia, described in this report, to address the growing and urgent problem of disease occurrence due to micronutrient deficiencies in the region. The initiative consisted of two sequential projects: the first, a pilot intervention to fortify two staple foods, salt and wheat flour; and the second, a series of activities to broaden and institutionalize mandatory fortification of these foods across the region.

Food fortification, as a means to deliver essential nutrients to the poor and vulnerable, also deserves renewed attention as ADB seeks to strengthen its assistance in achieving food security in the region. We hope this monograph on the results of the 7-year-long initiative presents evidence that food fortification indeed works, and that collective efforts by the government, the private sector, and civil society can mitigate debilitating micronutrient deficiencies in a relatively short period. The monograph also shares the challenges in and lessons learned from expanding food fortification, in the hope of benefiting ongoing and future food fortification projects in whatever small way it can.



Xianbin Yao
Director General
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Asian Development Bank

Foreword

In temperate zones of industrialized countries, soil, water, and food tend to be deficient in iodine, and populations are frequently deficient in this essential mineral. Iodine deficiency during pregnancy lowers the distribution of IQ scores of offspring. Iron deficiency is common in low-income populations, mainly because iron is poorly available in the predominantly cereal diet they can afford. Pregnant women and young children are those most vulnerable to iron deficiency. Infants of iron-deficient mothers have lower iron stores at birth and are at greater risk of developing iron deficiency anemia and impaired cognition. Folic acid deficiency in early pregnancy increases the occurrence of congenital defects of the spinal cord.

In any country, people who do not consume a diet providing sufficient available dietary iron and essential B vitamins suffer serious health consequences from deficiencies of these nutrients. Most industrialized and many developing countries rely on salt fortified with iodine, and cereal flours to which thiamine, riboflavin, niacin, and iron have been added. The former Soviet Union's centralized health system provided these measures for its citizens, but with its breakup in 1991, these vital measures were discontinued in most of the newly independent countries. When iodization of salt stopped, iodine deficiency and goiter returned. Poor economic conditions and deteriorating health services led to an increase in iron deficiency anemia and low vitamin intakes in some sectors of the population.

This was the situation in the five countries of Central Asia plus Mongolia in 2001 when Joseph Hunt, then senior health and nutrition economist at the Asian Development Bank (ADB), initiated the ADB project financed by a grant from the Japanese Fund for Poverty Reduction. Initially planned for the iodization of salt, the project was expanded to include the micronutrient fortification of wheat flour. The United Nations Children's Fund (UNICEF) became a partner, and Rie Hiraoka assumed responsibility for the project. She deserves great credit for its success. The strong support and regional influence of Toregeldy Sharmanov, director of the Kazakhstan Academy of Nutrition in Almaty, was critically important.

The project proceeded at different paces in the various countries. Given the obstacles, it could not be expected to achieve its goals in all of them, even when the project was extended from 3 to 7 years, including a follow-on project. However, it did convince governments and industry in the target countries of the health importance of the project, and secured their commitment to it. It did ensure that the necessary laws and regulations were in place in each country, and that the producers understood the technology and standards for the fortification of salt and wheat flour. The number of households using iodized salt dramatically increased during the project, and has been maintained.

At the end of the project, it was not possible to conduct representative national surveys to determine changes in the iodine, iron, and folic acid status in the populations of each participating country. This information will eventually be obtained as part of future national nutrition surveys. Some quantitative data on the effectiveness of the program were obtained through "sentinel sites," an approach adapted from one used for detecting the spread of infectious diseases. At the beginning of the project, a site was selected in each country where, for logistical reasons, early success would predict whether the program was to be effective nationally. A randomized population sample from each site was studied for nutritional status at the beginning of the project, and twice more.

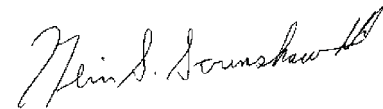
In the third round of surveys of the sentinel populations in 2007, significant increases were observed in the average levels of blood hemoglobin, serum ferritin, folic acid, and urinary iodine. Corresponding decreases in the prevalence of anemia were found. It could be concluded that salt and wheat flour fortification as a result of the project resulted in a significant improvement in the micronutrient status of sentinel

households in participating countries. Some of the data and a reference to the published report of the sentinel studies are given in this document.

To introduce micronutrient fortification into a country, it is essential to enlist the cooperation of both government and industry from the beginning, and this was done. Depending on a country's circumstances, this process can be rapid or discouragingly slow. Constant technical supervision and periodic meetings of all national personnel and consultants involved in the program were important to the project's success.

Shamil Tazhibayev of the Kazakh Academy of Nutrition (KAN) was responsible for the high quality of the laboratory results and was outstanding in his management of the sentinel studies. Mussa Aijanov of KAN made an important contribution to developing the standard flour fortification formula and obtaining its acceptance by all the participating countries.

Although the ADB project has ended, there is every reason to believe that progress will continue in the countries that participated. Certainly, all the personnel involved in this initiative at both the country and international levels can be proud of what was accomplished.



Nevin S. Scrimshaw, PhD, MD, MPH
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President, International Nutrition Foundation
Visiting Professor, Tufts University

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The initiative is heavily indebted to a wide range of people and organizations.

First, dedicated country project and regional coordination team members; government officials, especially officials of health ministries; food producers and nongovernment organizations of the project countries; professors of the Kazakh Academy of Nutrition; international advisors Nevin Scrimshaw, Peter Ranum, Frits van der Haar, and Gary Gleason; and colleagues of other development agencies, especially the United Nations Children's Fund (UNICEF).

Second, many ADB staff members contributed to the projects. The project would not have been born without Joseph Hunt, former Asian Development Bank (ADB) project officer, who managed to persuade ADB management and decision makers in the six countries to implement food fortification in the region. The project would not have stayed on the agenda of governments without the support of country directors and national officers of ADB resident missions in Central Asia and Mongolia, and sector directors. Project implementation benefited greatly from the tireless project analysts who simultaneously dealt with the requests coming from six country offices.

Rustam Muzafarov, the regional coordinator based in Almaty, monitored implementation in six countries, and coordinated the efforts of a large number of food producers, development agencies, and suppliers.

We would like to list the names of other key people to be especially acknowledged, although hundreds of people in the participating countries contributed to the projects.

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Natalya Mainster, office manager

Azerbaijan

Azerbaijan Research Institute of State Standards Committee (and Rauf Ismailov, director)

Krystal Salt Company (and Humbat Kerimov, director)

Babaturk Company (and Tofic Aliyev, chair of the board)

Kazakhstan

Nailya Karsybekova, country project coordinator

Kazakh Academy of Nutrition (and Toregeldy Sharmanov, president; Shamil Tazhibayev, vice-president; and Igor Tsoi, vice-president)

League of Grain Processors and Bakers of Kazakhstan (and Evgeny Gahn, chair)

National Commission on Family Affairs and Gender Issues
(and Aitkul Samakova, chair)

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 Don Mahsulotlari (Scientific Production Center) (and Dilorom Gafurova, director)
 National Youth Organization Kamalot (and Tuhtasin Arslanov, director of youth programs)
 National Research Institute of Endocrinology (and Said Ismailov, director)
 National Institute of Hematology (and Dilorom Suleimanova, head,
 Laboratory for Anemia Diseases)

During almost 7 years of project design and implementation, ADB country directors and social sector directors, and national officers and supporting staff both in resident missions and sector divisions, extended support through advocacy with the governments and helping the country project offices.

We are sure that the participating countries will join us in thanking the Government of Japan for financing the projects through the Japan Fund for Poverty Reduction (JFPR). The JFPR project for Improving Nutrition of Poor Mothers and Children in Asian Countries in Transition was close to \$7 million in size, which was not only more than the norm for JFPR projects in size but project implementation was also more complex. Approval for the JFPR project was gained with the help of Mr. Narita, then coordinator for JFPR funds in ADB; and approval for the JFPR project for Sustainable Food Fortification owed much to the support of the office of the Japanese executive director, and Mr. Araki, then JFPR coordinator.

This report acknowledges and draws heavily on the documents below from the food fortification initiative, and cannot fully reflect the richness of each report. Thus, we encourage interested readers to visit these documents for detailed accounts of each aspect of the initiative. Other sources are cited in the text.

ADB. 2001. *Proposed Grant Assistance to Asian Countries in Transition for Improving Nutrition for Poor Mothers and Children*. Manila (March).

———. 2004. *Proposed Grant Assistance to Kazakhstan, Kyrgyz Republic, Mongolia, Tajikistan, and Uzbekistan for Sustainable Food Fortification*. Manila (May).

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Gary Gleason. 2004. *Issues Paper on Communication Activities: Beyond Creation of Consumer Demand for Iodized Salt and Flour Fortification in Central Asia*. Manila: ADB (August).

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S. Tazhibayev, et al. 2008. Evaluation of the Potential Effectiveness of Wheat Flour and Salt Fortification Programs in Five Central Asian Countries and Mongolia, 2002–2007. *UN Food and Nutrition Bulletin*. 29 (4). pp. 255–265.

Abbreviations

ADB	– Asian Development Bank
APC	– anemia prevention and control
CPO	– country project office
IDA	– iron deficiency anemia
IDD	– iodine deficiency disorders
JFPR	– Japan Fund for Poverty Reduction
KAN	– Kazakh Academy of Nutrition
MICS	– multiple indicator cluster survey
NGO	– nongovernment organization
ppm	– parts per million
QAC	– quality assurance and control
SES	– sanitary epidemiological service
UNICEF	– United Nations Children’s Fund
USI	– universal salt iodization
USSR	– Union of Soviet Socialist Republics
WHO	– World Health Organization

Executive Summary

Background

During the 1990s, the newly emerging countries of Central Asia, as well as neighboring Mongolia, faced a growing and urgent problem of disease caused by micronutrient deficiencies. In response, the Asian Development Bank (ADB) decided to mount a regional food fortification initiative to reverse this spreading public health problem that was particularly affecting poor women and children and was costing the countries about 1% of their gross domestic product.

The major micronutrient deficiencies were iodine deficiency disorder and iron deficiency anemia (IDA). Iodine deficiency is the single most important cause of irreversible mental retardation in the world, and also causes cretinism-associated problems, including goiter. The prevalence of goiter ranged from 23% to 73% in children in Central Asia at the time the initiative began—well above the 5% cutoff used to signal a public health problem. IDA, which impairs the cognitive development of young children, reduces the work productivity of manual laborers, and is a major cause of maternal mortality, is the most prevalent nutrient deficiency in the world. This deficiency was present in 38% of children under 5-years old and more than half of all pregnant women in Central Asia and Mongolia; again, well above the cutoff and indicating IDA was a serious public health problem.

ADB's involvement is rooted in its Policy for the Health Sector. The policy notes that improvements in health support economic growth through (i) increased worker productivity, (ii) increased returns to investments in education, (iii) increased returns to other factors of production, and (iv) freeing up financial resources by preventing disease. Investments in health also help to reduce poverty because the poor suffer from worse health status and face more serious economic and financial consequences when they become ill. These observations apply equally well to the specific problem of micronutrient deficiencies.

However, ADB also recognizes that the solution to eliminating deficiencies in iodine, iron, and other micronutrients is not only a challenge for health policy in a narrow sense but is also a challenge for industrial policy. The private sector has played a major role in improving the quality of foods people regularly consume in industrialized countries.

Food fortification has helped reduce public health problems in many countries. This initiative in Central Asia, however, was unique in its regional approach and was the first major initiative using public-private partnership to address public health problems in the region. It faced several major unknown regional development factors:

- Would public-private partnership toward sustainable food fortification work in countries newly emerging from centralized economies?
- Could fortified staple foods be made affordable for the poor in Central Asian countries and Mongolia?
- Would target countries gain added value through a regional approach to food fortification? In particular:
 - Could regional developing-country standards in food fortification, and the policy and regulatory environment to enforce them, be created, and implemented?
 - Could region-wide demand and supply for fortification to improve health be created?

The Regional Fortification Initiative

ADB's food fortification initiative in Central Asia and Mongolia was conducted through two region-wide projects supported by the Japan Fund for Poverty Reduction. ADB approached the governments of Azerbaijan, Kazakhstan, the Kyrgyz Republic, Mongolia, Tajikistan, and Uzbekistan¹ and obtained their agreement to participate in the initiative, with the United Nations Children's Fund (UNICEF) as the main partner. From the beginning of the initiative, the Kazakh Academy of Nutrition (KAN) provided technical guidance and took part in monitoring and evaluation.

The first project, Improving Nutrition for Poor Mothers and Children in Asian Countries in Transition, aimed to improve the nutritional status and physical and mental capacity of the poor, particularly targeting poor women of reproductive age and children, by establishing an umbrella regional program to deliver micronutrient-fortified salt and wheat flour.

The second project, Sustainable Food Fortification in Central Asia and Mongolia, aimed to reinforce and sustain the reduction of iron deficiency disorder and IDA among poor women and children in Central Asia.

There were five major components of the initiative:

- **Roundtable conferences and regional and national workshops.** Three roundtable conferences brought together stakeholders from the countries and aid agencies to discuss strategies and targets, resolve major issues, and review progress. Eight regional workshops sought to build capacity among the project countries to deal with pressing issues as they arose. National workshops covered issues that needed agreement and coordination among the various stakeholders.
- **Fortification of salt and flour.** Iodization of salt, already being done to some extent in the region, and fortification of flour with iron and several vitamins that were also deficient in the region—which had not been attempted in the region and required development of a special “premix”—were the approaches followed. Salt producers, flour millers, and bakers were assisted in upgrading processing and marketing technology. A 1-year supply of fortificants was also provided.
- **Capacity development.** The initiative provided capacity development in appropriate areas to salt industry and flour mill personnel, government officers, and regulatory authorities.
- **Social marketing and mobilization.** A communication strategy was developed to strengthen activities in policy and regulatory advocacy, provide organizational motivation and training, create new alliances, and provide community communication to generate demand for fortified foods.
- **Monitoring and evaluation.** Monitoring included project supervision, technical workshops, midterm review, annual auditing, and a rigorous efficacy study on the impact of fortified food.

¹ Azerbaijan joined after the project was approved for the other five countries, and a separate supplementary agreement was prepared.

Achievements

By the end of the initiative in 2007, the participating countries were well on the way toward universal salt iodization, and at least three countries had established sustainable wheat flour fortification.

Production of iodized salt through the initiative increased significantly and even exceeded regional demand, and the proportion of households using quality iodized salt increased in all countries during the initiative, reaching 90% in Kazakhstan. By the end of the initiative, all countries had enacted legislation making iodization mandatory.

Initiative results indicate that almost 24 million new consumers of iodized salt were added in the region during the first Japan Fund for Poverty Reduction project, and an additional 500,000 newborns were protected against brain damage resulting from iodine deficiency. The annual economic costs avoided by the correction of iodine deficiency across the region through the initiative are estimated at up to \$300 million.

A new premix for wheat flour was developed for the initiative at KAN, based on recommended dietary intakes, nutritional requirements and deficiencies in the region, and cost. Over the duration of the initiative, the numbers of millers fortifying their flour and moves by governments toward making flour fortification mandatory increased.

Wheat flour fortification significantly improved the micronutrient status of children and women living in households where fortified flour was expected to be available. Overall anemia rates dropped from 42% to 34% in women and from 35% to 22% in children. Ferritin levels increased in both children and women, showing improvement in iron status, and levels of folate, one of the vitamins added to flour, increased in both women and children. The overall level of severe folic acid deficiency dropped from 39% to 2% in children and from 13% to 2% in women.

Under the umbrella of the initiative, all the participating countries agreed on a set of fortification standards and made regulations and laws accordingly. Adoption of common standards took place in the remarkably short time of about 2 years.

Much of the credit for the success of the initiative is because of awareness, communication, and marketing activities, through which the participating countries were able to obtain the support of decision makers and other stakeholders down to community members. Coordination of each tier of communication activities from policy level to that of the community was important to ensure that the right messages were available at the right time. In particular, motivating all the key players in fortification was a major task and key factor.

Development Issues

The three development issues that ADB addressed in the initiative were all answered positively. Public–private partnership in these mainly newly emerging market economies proved successful and vital. Collaboration during the initiative helped establish good working relations and strong partnership between the government and the salt industry and flour millers in all the countries, and the salt industry and flour millers gradually developed a sense of ownership of the fortification program. Formation of industry associations and collaboration of government and nongovernment organizations in workshops, etc., further helped sustain the fortification programs.

The question of affordability to the poor was initially a concern. Salt and wheat flour are the most basic staples in the region and are very sensitive to price change. When the initiative started, the price of iodized salt was higher than that of noniodized salt, while the cost of flour fortification, a new concept for the region, was an unknown factor. However, by the time the initiative ended, the price differentials were insignificant. This was due in part to increasing ownership and investment by the producers due to the

mandatory nature of fortification in the region. Also, growing demand allowed for economies of scale in production.

Finally, the regional approach was vindicated, despite the competitiveness of the Central Asian countries and their many pressing development problems and priorities. The regional approach enabled establishment of common standards for fortified salt and flour, achieved economies of scale, took advantage of cross-learning, and enriched interregional cooperation. ADB support on a country-by-country basis would not have had these advantages and would have been unable to address regional issues, such as trade and its regulation.

Lessons

A great many lessons that will prove useful for future work in this field were learned. The following are some major ones:

- Mandatory fortification legislation is a prerequisite for ensuring universal access to fortified foods.
- Political support at the highest level is needed to ensure sustainability of food fortification programs.
- Public–private partnership was essential in sustaining the momentum of the initiative.
- Quality control in most of the countries was difficult and needs further strengthening at both industrial and retail levels.
- Incentives for food producers were essential during program development to prevent their discouragement because of initial losses during fortification start-up. Cost sharing by industry, however, was an important first step toward sustainability. Donor dependency appeared to be one of the reasons that universal salt iodization had not happened previously.
- Financial capacity of food producers is a key to sustainable food fortification. For small producers, innovative ways to ensure reliable and reasonably priced fortificant supplies are necessary.
- A strong initial information base is necessary on, for example, prevalence of deficiencies and the production and financial capacity of salt and flour producers; if absent, it should be an early priority of fortification programs.
- A need for awareness building on the advantages of fortified food and its limited availability at local markets was evident in order to increase demand from producers and consumers. Intense awareness campaigns were needed and innovative ways to improve demand are still required.
- Limited information hampered the initiative from the outset. The initiative filled critical information gaps in food fortification knowledge in the participating countries that will be vital for future fortification activities in the region. Still, any new attempt to fortify food should be preceded by situation analysis of the particular food industry in addition to studying the feasibility of fortification itself.
- Technology transfer accelerated establishment of food fortification better than using foreign capacity. Domestic capacity development helped the countries to carry out food fortification without external help.
- Risks of external shocks need to be taken into account. For example, wheat flour production, availability, and price vary depending on weather. This had a serious impact on flour fortification during the initiative. Political stability is another major factor in program sustainability.

Conclusions

In view of the successes of the initiative, the validation of ADB's regional approach to fortification, and in light of the lessons from the initiative, ADB should continue in its role of catalyst in nutrition development efforts in the region, particularly in advocating and promoting fortification of foods that can improve the micronutrient status of the poor.

Inclusive growth and regional integration are two of the three strategic agendas of ADB's long-term strategic framework for 2008–2020, Strategy 2020,² which emphasizes the private sector as a driving force for inclusive growth. Through public–private partnership, ADB should reinvigorate its efforts to promote food fortification so as to deliver much-needed micronutrients to populations in need.

² ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank 2008–2020*. Manila.

This map illustrates the geographical context of Central Asia, showing its position relative to neighboring countries and major bodies of water. Key features include:

- Central Asian Countries:** Kazakhstan, Kyrgyz Republic, Uzbekistan, Turkmenistan, and Afghanistan.
- Surrounding Countries:** Russia (Federation), Mongolia, China (People's Republic), Pakistan, Iran, Georgia, Armenia, and Azerbaijan.
- Major Bodies of Water:** Black Sea, Caspian Sea, Persian Gulf, and Arabian Sea.
- Key Cities:** Astana (Kazakhstan), Bishkek (Kyrgyzstan), Tashkent (Uzbekistan), Ashgabat (Turkmenistan), Kabul (Afghanistan), and Ulaanbaatar (Mongolia).
- Geographical Features:** The Aral Sea is shown as a significant water body in the region.
- Legend:**
 - National Capital (star in a circle)
 - Provincial Capital (star in a square)
 - City/Town (black dot)
 - Cross Border Point (open circle)
 - River (blue line)
 - International Boundary (dashed line)
- Scale:** 0 to 400 Kilometers.
- Coordinates:** The map includes latitude and longitude markings (e.g., 40°00'N, 50°00'N, 60°00'E, 100°00'E).

Source: ADB.

1. Background

Central Asia's Micronutrient Deficiencies

In 2001, the British Broadcasting Corporation produced a television documentary about the rising incidence of cretinism, mental retardation, and associated problems, such as goiter, in children in Central Asia. From Azerbaijan in the west to Mongolia in the east, across Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan, the story was the same.

These conditions, caused by iodine deficiency, could be traced to the breakdown of health programs in the former Soviet republics toward the end of the Soviet Union. Initially, the republics were served from a few centralized agencies around the former Soviet Union, depending on need. Iodine was a well-known need, and iodized salt was distributed regularly from Ukraine, reaching most of the populations in iodine-deficient areas. By the time the Soviet Union disintegrated in 1991, however, the iodine program had virtually disintegrated. Mongolia took action in the mid-1990s to fortify salt, but by the end of the decade, less than half the population was using iodized salt.

The countries in and around Central Asia lie in areas with low soil iodine, leaving fish as the

main source of natural iodine. On the western side of the region, Caspian Sea fish have high iodine content, but elsewhere the harvest is freshwater fish, which have low iodine content. Regardless, most of the region's fisheries declined in the decade after independence—by up to 90% in most countries.

The countries' economies also were stretched as they grappled with the overnight demise of the Soviet centrally planned economy. The 1990s saw a great increase in poverty in Central Asia, from which individual countries are still recovering as they come to grips, at different speeds, with a market economy. After food subsidies were withdrawn, many residents could not afford adequate nutrition in the decade after independence.

Therein lies the core problem: While foods may appear to be adequately nutritious, providing sufficient carbohydrates, fats, and protein, they may lack iodine. Iodine content depends more on the soil level of iodine than on other factors, so what may be an iodine-sufficient diet in one place may be insufficient elsewhere. The consumer has no way of knowing, in the absence of health or food surveys, that a creeping public health problem is unfolding; hence, the problem is called "hidden hunger."

Goiter is the physical trait commonly used for identifying iodine deficiency disorders (IDD).

Table 1.1: Prevalence of Goiter among Children in Central Asia and Mongolia

Item	Azerbaijan ^a	Kazakhstan	Kyrgyz Republic	Mongolia	Tajikistan	Uzbekistan
Total goiter prevalence (%) (survey period)	11.1 (1996)	36.7 (2000–2001)	49.1 (1994)	23.0 (2001)	68.7 (1999)	73.0 (1998)

^a Azerbaijan's data are on prevalence in adults.

Source: B. de Benoist, et al., eds. 2004. *Iodine Status Worldwide*. WHO Global Database on Iodine Deficiency. Geneva: WHO.

At the end of the 1990s, goiter prevalence among school-aged children ranged from 23% to 73% in Central Asia—well above the 5% cutoff used to signal a public health problem (Table 1.1).¹

Hidden hunger is not confined to iodine deficiency. Iron deficiency anemia (IDA) affects more people in the world than any other condition.² IDA impairs the cognitive development of young children, reduces the work productivity of manual laborers, and is a major cause of maternal mortality. The delay in cognitive development is often irreversible. It is prevalent in wheat-eating populations, such as those in Central Asia and Mongolia, because essential micronutrients are lost during wheat milling. This deficiency was present in 38% of children under 5 years old and more than half of all pregnant women in Central Asia and Mongolia—again, well above the 5% cutoff used to signal a public health problem (Table 1.2).³

The developmental importance of folic acid deficiency,⁴ which results in a severe birth defect involving the brain or spinal chord (spina bifida),

and zinc deficiency,⁵ which causes suboptimal body functioning, has recently also been recognized.

Micronutrient malnutrition is more than a health problem. Estimates from a number of countries suggest that micronutrient malnutrition has cost the national economies in Central Asia about 1% of their gross domestic product.⁶ The public investment required to eliminate the deficiency is low compared to the savings in health care and education costs, improved work ability and productivity, increased economic growth, and local and national development.

Indeed, some countries were giving priority to reducing IDD; yet, despite assistance from the World Health Organization (WHO), United Nations Children's Fund (UNICEF), and some bilateral donors, not much more than 20% of households in Central Asia were using iodized salt by the end of the 20th century.

Public health programs can provide supplements to certain groups for a short time, but they are

Table 1.2: Anemia Prevalence in Central Asia and Mongolia (%)

Country	Preschool Children (<5 years old)	Pregnant Women	Nonpregnant Women of Reproductive Age
Azerbaijan	32	38	40
Kazakhstan	36	26	36
Kyrgyz Republic	50	34	38
Mongolia	21	37	14
Tajikistan	38	45	41
Turkmenistan	33	30	48
Uzbekistan	38	54	65

Note: WHO category of public health significance for anemia prevalence: mild 5.0%–19.9%; moderate 20.0%–39.9%; severe 40.0%.

Source: B. de Benoist, et al., eds. 2008. *Worldwide Prevalence of Anaemia 1993–2005*. WHO Global Database on Anaemia. Geneva: WHO.

¹ B. de Benoist, et al., eds. 2004. *Iodine Status Worldwide*. WHO Global Database on Iodine Deficiency. Geneva: World Health Organization (WHO).

² WHO. 2009. *Micronutrient Deficiencies*. www.who.int/nutrition/topics/ida/en/index.html

³ B. de Benoist, et al. 2008. *Worldwide Prevalence of Anaemia 1993–2005*. WHO Global Database on Anaemia. Geneva: WHO.

⁴ There is now general agreement that women need 400 micrograms of folic acid per day, an amount that cannot be provided by normal diets, which indicates the need for fortification or supplementation. N. Wald, et al. 2001. Quantifying the Effect of Folic Acid. *Lancet*. 358 (9298). p. 2,069.

⁵ Zinc is required for normal growth and health; deficiencies affect about one-third of the world's population. WHO. 2002. *World Health Report 2002. Reducing Risks, Promoting Healthy Life*. Geneva.

⁶ ADB. 2005. *Special Evaluation Study of Selected ADB Interventions on Nutrition and Food Fortification*. Manila.

neither comprehensive nor sustainable. The most cost-effective solution lies in promoting iodized salt and iron-fortified wheat flour (two major staples in the region) to combat IDD and IDA.⁷

Cost-effective technologies can increase access to iodized salt and iron-fortified wheat by the poor. Fortifying salt with potassium iodate costs an extra \$0.05 per person per year, and fortifying wheat flour with iron costs an extra \$0.09 per person per year.⁸ Fortifying both salt and flour reduces maternal mortality and enhances cognitive development in young children. Also, mass fortification of food staples does not require people to change their eating habits. Resistance to changing eating habits has proven to be a major obstacle in supplementation programs and diet changes.

Until 2001, no large-scale fortification efforts were made to address IDA in the region. In 1997, UNICEF began an anemia prevention and control program in the Central Asian countries, using supplements of iron tablets, or iron tablets and folate tablets, and education on the health issues. This program continues, but education alone has limited effect, while distributing free supplements requires continuous funding by donor agencies or the government. UNICEF also started two country projects in Central Asia involving fortifying flour with iron. One of these projects, in Turkmenistan, began in 2000 and continues to the present.

The Central Asian countries born from the dissolution of the Soviet Union in 1991 suffered pressing micronutrient problems for a decade, with each country making attempts to address the problems internally (Appendix 1). What brought the issues to international attention in 2001?

The occasion was a high-level forum in Almaty, Kazakhstan, where a landmark agreement was forged by the Central Asian countries and Mongolia. This Almaty Declaration (Appendix 2) committed them to mitigating micronutrient malnutrition—their hidden hunger—with support from the Asian Development Bank (ADB) and the Japan Fund for Poverty Reduction (JFPR). The countries agreed on

a set of food fortification principles, strategies, and actions involving cooperation and harmonization in food standards and trade regulations across the region.

Yet, they still had far to go on the road to economic health. Many visible problems had to be overcome, while hidden hunger remained invisible to both policy makers and the public. The private sector was not being encouraged to fortify food products.

Additionally, the countries were only a decade old and inexperienced in working with the private sector. Several attempts by donors to promote regional economic cooperation on water resources and other issues had failed, and the countries had little experience of dealing with multilateral institutions, such as ADB. So, it was a serious question if such a region-wide program would work.

ADB's Involvement with Food Fortification

ADB Policy

Nutrition is a priority in many projects and programs supported or initiated by ADB. ADB has shown clear and strong support for nutrition interventions, such as nutrition education, curbing micronutrient deficiencies, basic nutrition for women, food fortification, and early childhood development. Such support for nutrition is either integrated into, or complementary to, support for other areas, such as livelihood and water resources, health (especially public health programs such as maternal and child health), education, and gender-related areas.

ADB's involvement is rooted in its Policy for the Health Sector.⁹ The policy notes that health improvements support economic growth through (i) increased worker productivity; (ii) increased returns on investments in education; (iii) increased returns on other factors of production; and (iv) preventing disease, which frees up financial resources. Investments in health also help reduce

⁷ Despite their limitations, both dietary diversification through a broad-based food policy and supplementation for high-risk groups remain options in an integrated strategy for eliminating micronutrient malnutrition.

⁸ Although a bit more expensive, an iron-based flour premix with minerals is highly cost-effective in reducing nutritional deficiencies and improving public health and the educability of children.

⁹ ADB. 1999. *Policy for the Health Sector*. Manila.

poverty, because the poor suffer from worse health in general and face more serious financial consequences when they become ill. So, investments in health contribute to human development and population planning. These general observations apply equally to the specific problem of micronutrient deficiencies.

However, ADB also recognizes that the solution to eliminating deficiencies in iodine, iron, and other micronutrients is not only a challenge for health policy in a narrow sense, but is also for industrial policy. The private sector has played a major role in improving the quality of foods people regularly consume in industrialized countries.

As a regional financial institution, ADB sees fortification as an area where the private food producers, governments, and consumers can collaborate, and is a good example of how human and economic development can mutually reinforce.

Manila Forum 2000—a Turning Point

Recognizing that deficiencies in certain vitamins and minerals constitute a serious health problem throughout Asia and the Pacific, ADB combined resources with the Micronutrient Initiative and the International Life Sciences Institute to conduct the Manila Forum 2000: Strategies to Fortify Essential Foods in Asia and the Pacific, a 4-day meeting on using food fortification to address nutrient deficiencies. The February 2000 conference, attended by delegations from eight developing countries in Asia and the Pacific, including the Kyrgyz Republic, produced a consensus statement that included: “All salt intended for human consumption should be iodized” and “flour fortification with essential vitamins and minerals should be an integral part of all strategies to control and prevent micronutrient deficiencies.” The meeting also advocated that “centers of excellence” be established around the world to help support food fortification.¹⁰

As a result of the Manila Forum 2000, ADB and partners mounted a regional initiative to fortify essential foods for the poor. In the Central Asian countries and Mongolia, hidden hunger was gradually depriving the citizens, especially mothers and young children, of nutrition adequate for proper physical and mental development.

Development Questions

Food fortification has helped reduce public health problems in many countries. This initiative in Central Asia, however, was unique in its regional approach and was the first major initiative using public–private partnership to address public health problems in the region. It faced several major unknown regional development factors:

- Would public–private partnership toward sustainable food fortification work in countries newly emerging from centralized economies?
- Could fortified staple foods be made affordable for the poor in Central Asian countries and Mongolia?
- Would target countries gain added value through a regional approach to food fortification? In particular:
 - Could regional developing-country standards in food fortification, and the policy and regulatory environment to enforce them, be created and implemented?
 - Could region-wide demand and supply for fortification to improve health be created?

¹⁰ ADB. 2000. *Manila Forum 2000: Strategies to Fortify Essential Foods in Asia and the Pacific*. Manila; Washington, DC: International Life Sciences Institute; Ottawa: Micronutrient Initiative.

2. The Regional Fortification Initiative

Because of Central Asia's regional unknowns, ADB and client countries could not immediately proceed to develop a normal loan project. In this case, the JFPR had just been set up under ADB's administration to finance pilot projects for poverty reduction. ADB seized the opportunity and convinced the Government of Japan to finance a food fortification pilot in the region.

ADB's food fortification initiative in Central Asia and Mongolia was conducted through two region-wide projects supported by the JFPR. ADB approached the governments of Azerbaijan, Kazakhstan, the Kyrgyz Republic, Mongolia, Tajikistan, and Uzbekistan¹¹ and obtained their agreement to participate in the initiative (see map on page xviii). UNICEF and the Kazakh Academy of Nutrition (KAN) were the main partners. From the beginning, KAN provided technical guidance and took part in monitoring and evaluation.

The first project—Improving Nutrition for Poor Mothers and Children in Asian Countries in Transition (hereafter called the first JFPR project)¹²—began in 2001 and ran for 3.5 years. The project aimed to improve the nutrition status and physical and mental capacity of the poor, particularly targeting poor women of reproductive age and children, by establishing an umbrella regional program to deliver micronutrient-fortified salt and wheat flour.

The second project—Sustainable Food Fortification in Central Asia and Mongolia (the second JFPR project)¹³—began in early 2005 and ended in 2007. It aimed to reinforce and sustain the reduction of IDD and IDA among poor women and children in Central Asia.

The first project received \$6.8 million, and the second received \$2.0 million, from the JFPR administered by ADB. By the time of the second project, private food producers had become major investors in food fortification.

Objectives and Strategies

The main objective of the first JFPR project was to expand salt iodization in the region, which had been initiated in Central Asia by UNICEF and other groups but had reached only part of the populations. Flour fortification was included mainly to address the widespread problem of IDA. This project provided technology and equipment for fortification according to best international practices. It sought to reach a significant proportion of the populations; enable a consensus among the countries on regional standards for food fortification, marketing, and trade; strengthen the food sector's regulatory capability; and increase consumer demand through nongovernment organization (NGO) partnerships.

¹¹ Azerbaijan joined after the project was approved for the other five countries, and a separate supplementary agreement was prepared.

¹² ADB. 2001. *Grant Assistance to Kazakhstan, the Kyrgyz Republic, Mongolia, Tajikistan and Uzbekistan for Improving Nutrition for Poor Mothers and Children in Asian Countries in Transition*. Manila. Azerbaijan was added using a supplementary grant in 2001 after the grant was approved.

¹³ ADB. 2004. *Grant Assistance to Kazakhstan, the Kyrgyz Republic, Mongolia, Tajikistan and Uzbekistan for Sustainable Food Fortification*. Manila. Azerbaijan was not covered by this project.

The objectives of the second JFPR project were to sustain household consumption of iodized salt achieved under the first project, and to expand flour fortification and make it sustainable. The second project also paid parallel attention to supply (production and distribution), demand (public awareness and demand creation), and regulation (quality control, implementation of regulations and legislation, and trade facilitation) but did not finance any fortificant or equipment for food producers.

Scope of the Initiative

The projects comprised five major components.

1. Roundtable Conferences and Regional and National Workshops

Three roundtable conferences were held in Almaty and became known as the Almaty Forums. Their intent was to bring together stakeholders from the Central Asian countries and development agencies to discuss strategies and targets, resolve major issues, and review progress. Participants included representatives from the participating countries' public health services, the private sector (federations of flour millers and salt producers), NGOs that focus on women and children, external assistance agencies, and senior central and local government officials. As the initiative progressed and the region became recognized as a business opportunity, international suppliers of equipment and fortificants began participating as observers.

Regional workshops sought to build capacity, such as communications, regulations and standards, production technologies, and monitoring and evaluation, among the project countries to deal with urgent issues. Regional workshops were also used by private food producers to build networks with international suppliers. Similarly, national workshops were held to cultivate awareness, capacity, and social

mobilization. (The workshop topics, locations, and dates are given in Appendix 3.)

2. Fortification of Salt and Flour

Iodization of salt, a universally used commodity, was already established worldwide as the preferred way to improve iodine levels in human populations. The first JFPR project endorsed this approach, using universal salt iodization (USI) standards.

For flour fortification, the picture was less clear. There had been no previous attempt on a large scale to introduce iron into wheat flour in the region,¹⁴ and there were other prominent deficiencies in the populations that could be reversed through fortification of flour with other micronutrients, particularly folic acid (effective in reducing neural tube birth defects) and zinc (required in adequate amounts for normal pregnancy and healthy growth of children). Fortification also provided the opportunity to introduce essential B-complex vitamins.

The participating governments worked with selected salt producers, flour millers, and bakers to upgrade and retool processing technology for micronutrient-enriched salt and wheat flour. The initiative provided a 1-year supply of fortificants—potassium iodate for salt and iron-based premix for flour—and subsidized two-thirds of the fortificant costs. It also advised on the most appropriate ways of iodizing salt, and provided some essential laboratory equipment and diagnostic reagents.

Through the initiative, participants made bulk purchases of equipment and fortificants, thus achieving both economy of scale and standardization of inputs (Table 2.1). However, the different salt supply situation among the countries required different approaches in order to increase the number of people in each country who regularly consumed iodized salt. In some cases, the availability of imported or freely available noniodized salt complicated the approach.

¹⁴ Two previous flour fortification projects in Central Asia—one in the Kyrgyz Republic in 1995 and one in Turkmenistan in 2000, both initiated by UNICEF—involved fortifying flour with iron from ferrous sulfate. The Kyrgyz Republic project ran into trouble when some of the fortified flour turned rancid and changed color. Turkmenistan continues to fortify flour.

Table 2.1: Physical Inputs for Salt Iodization in the First Japan Fund for Poverty Reduction Project, by Country

Country	Number of Beneficiary Industries	Project Support				Total Costs* (\$)
		Potassium Iodate (tons)	Iodization Equipment	Packaging Equipment and Supplies	Packaging Supplies	
Azerbaijan	3	0.30	1	3	Salt bags	61,410
Kazakhstan	2	3.25	1	1	Salt bags	76,410
Kyrgyz Republic	7	1.00	3	2	Salt bags and film rolls	75,406
Mongolia	22	0.20	...	4	Salt bags	61,306
Tajikistan	3	1.15	2	2	Salt bags	90,116
Uzbekistan	13	3.90	12	5	Salt bags and film rolls	268,651
Total	50	9.80	19	17		633,299

* Including installation costs.

Source: ADB. 2008 Sustainable Food Fortification in Central Asia and Mongolia Implementation Completion Report. Consultant's report. Manila.

The flour fortification initiative focused first on the larger flour mills, with the aim of covering one-third of each country's flour consumption.¹⁵ As with salt, imports of nonfortified flour complicated the work.

3. Capacity Development

The initiative helped salt industries and flour mills procure fortificants, equipment, and other essential items for food fortification, along with assuring the quality of fortified food. It helped governments develop and strengthen fortification policy and implement food fortification legislation and regulations; improve the quality assurance and control (QAC) systems of both governments and food producers, including border control of trade in salt; and develop regulatory frameworks, standards, and agreements to facilitate trade of fortified food in the region. It also helped regulatory authorities develop food-testing instruments and surveys for

monitoring the enriched food program for mothers and children.

The regional workshops helped fortification stakeholders develop capacity in areas of concern across the participating countries. All countries sent qualified delegations to the workshops, which were based on the latest food science and technology and assisted by qualified international consultants. The country delegations were headed by senior government officials and included representatives from the private sector and civil society.

KAN and UNICEF sent delegations to all roundtable meetings and regional workshops. As the project progressed and received international attention, the Global Alliance for Improving Nutrition (GAIN), the Centers for Disease Control and Prevention (CDC), and interested suppliers also participated at their own cost. Private food producers started financing their own participation at regional workshops in the second half of the initiative.

¹⁵ The original resolution was to fortify flour to the maximum extent possible in the region. An early objective was to enable a sufficient number of mills in each country to fortify flour so that one-third of wheat flour consumed in the country would be fortified. This was later refined to fortifying the premium and first-grade flour, because other types of flour were not intended to be fortified. The "one-third" objective was an arbitrary figure used to establish the number of mills to set up for fortifying flour and the quantities of premix to order, and to qualify the project's degree of success. That objective proved to be an overly ambitious goal that was unrealistic for some of the participating countries.

4. Social Marketing and Mobilization

The public, especially the target groups of poor women and children, had to be informed about fortified food in a structured way that would lead them to select the foods as they came available. The initiative needed to promote public awareness and acceptance of micronutrient-enriched salt and wheat flour, and to support innovative activities in communities that would increase the poor's access to these foods.

The first JFPR project developed a communication strategy to strengthen activities in policy and regulatory advocacy, provide organizational motivation and training, create new alliances, and provide community communication to generate demand for fortified foods. Government officials and prominent people appeared on television advocating fortified foods. Parliaments conducted hearings. The initiative supported production of audiovisual materials, pamphlets, posters, and publications in newspapers; workshops; and training. It engaged NGOs to conduct social mobilization activities. KAN screened materials before release to ensure that the same message was communicated in each country.

5. Monitoring and Evaluation

Monitoring the initiative's progress included project supervision, technical workshops, midterm review, annual auditing, and quarterly or annual review of interim indicators including production of fortified salt and wheat flour and their quality; also, a sentinel study on the efficacy of fortified food and economic analysis of food fortification to reduce IDD and IDA were also undertaken.

A monitoring and evaluation framework that included several performance indicators was agreed upon at one of the regional workshops among country project offices (CPOs) (Appendix 4). The main objective of the sentinel study was to evaluate the effect of food fortification on people's micronutrient status. The study periodically examined micronutrient status and consumption of fortified foods among the same sample households—40 households and 120 individuals (80 children

2–15 years of age and 40 women 15–49 years of age) in each country.

The first survey, from December 2002 to April 2003, established a baseline. A second survey followed in May–August 2004, and a third in the latter half of 2007. Each survey interviewed participants, took blood and urine samples, and tested the salt and flour that participants used. UNICEF shared the cost of the first and second surveys.

The initiative and UNICEF jointly financed the first-ever nutrition survey in Tajikistan in 2003.¹⁶

Alliance Building

Before the initiative began, ADB reached an understanding with the finance ministries in the six participating countries that the projects would require some governance reforms. Notes of discussion detailing the responsibilities of ADB, government, private sector, and donor partners were approved by all governments, who promised to apply fiscal and trade reforms for the duration of the project—and possibly beyond if the reforms worked well. At the first Almaty Forum, the notes of discussion were converted to country investment plans to reduce micronutrient deficiencies. These discussions defined the roles for the different stakeholders, as follows:

- The central governments of the project countries would establish legal and regulatory frameworks for producing safe fortified foods, provide incentives in the form of tax and tariff exemption for equipment and fortificants, and reduce value-added tax for fortified foods.
- Private food producers (except flour mills in Uzbekistan, which were partly owned by the government) would produce iodized salt and fortified flour.
- The public health services in each country would undertake surveillance and monitoring.
- NGOs in partnership with the governments would carry out social marketing campaigns to stimulate demand.

¹⁶ Ministry of Health of the Republic of Tajikistan, UNICEF, ADB, and WHO. 2004. *Nutrition Status of Mothers and Children in Tajikistan*. Dushanbe.

The initiative invested time and energy in building alliances among the governments, private food producers, and civil society. Each country established a steering committee comprising representatives of the public and private sectors, and civil society. The steering committees later became national food fortification alliances. Similarly, the initiative worked to build the capacity of associations of food producers and helped the associations network with those in other countries.

Implementation Arrangements

ADB coordinated the projects. The Regional Coordination and Administration Office was set up in Almaty to coordinate activities for all participants and be responsible for procuring equipment and fortificants. Each participating country had a CPO and a steering committee for project oversight, comprising representatives from the finance, planning and investment, and health ministries; the private food industry; and the NGO community.

For the first project, each country selected special-focus oblasts (provinces) or raions (districts) for intensive project coverage. These were usually among the poorest areas of the countries. Although some activities (such as community mobilization) concentrated in these pilot areas, substantial parts of project activities covered the nation. Food producers were not necessarily selected from the pilot areas. But by the second project, all activities covered the entire countries.

The ministries of health of the participating countries were the executing agencies of the national projects through the CPOs. The CPOs were headed by the country project coordinators, who were health specialists supported by financial analysts. The coordinators worked closely with different government ministries and agencies, the private sector food industries, and NGOs.

Each country developed a country investment plan that was agreed upon between each government and ADB. The CPOs submitted financial, progress, and project completion reports to the Regional Coordination and Administration Office, which monitored financial disbursement and project activities and prepared consolidated project reports and consolidated financial statements.

Achievements of the Initiative

Despite the unknown factors faced at its beginning, the initiative succeeded on various fronts:

- The number of households which regularly use iodized salt dramatically increased.
- Two countries (Kazakhstan and Mongolia) demonstrated sustainable-quality production of fortified wheat flour, although the initiative's objective to fortify one-third of wheat flour consumed in the participating countries proved difficult, particularly for countries with high flour imports and little wheat production.
- All participating countries moved towards USI and enacted USI laws.
- All participating countries adopted common standards for iodization and flour fortification within 2 years,
- Iodized salt and fortified flour were affordable.

Fortification

Iodized Salt Production

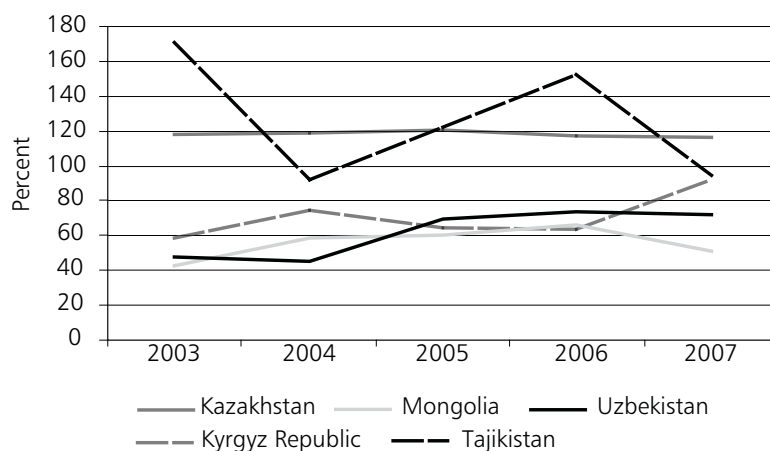
At the beginning of the initiative, each country introduced amendments of the iodized salt production standard, specifically on iodization level (30–40 parts per million [ppm] in all countries) and the substitution of potassium iodate for potassium iodide.

Through the initiative, production of iodized salt increased significantly and even exceeded regional demand (Figure 2.2), and subsequently the number of households consuming iodized salt dramatically increased (Figure 2.3).

While only about 25% of households of the participating countries were using iodized salt at the beginning of the initiative, by the end of the first project about 66% of the households were using iodized salt, and the rate was maintained through the second project. The multiple indicator cluster surveys (MICSs) have confirmed the outstanding progress made in Kazakhstan, the Kyrgyz Republic, and Mongolia, and the significant progress made in Tajikistan and Uzbekistan (Figure 2.3).

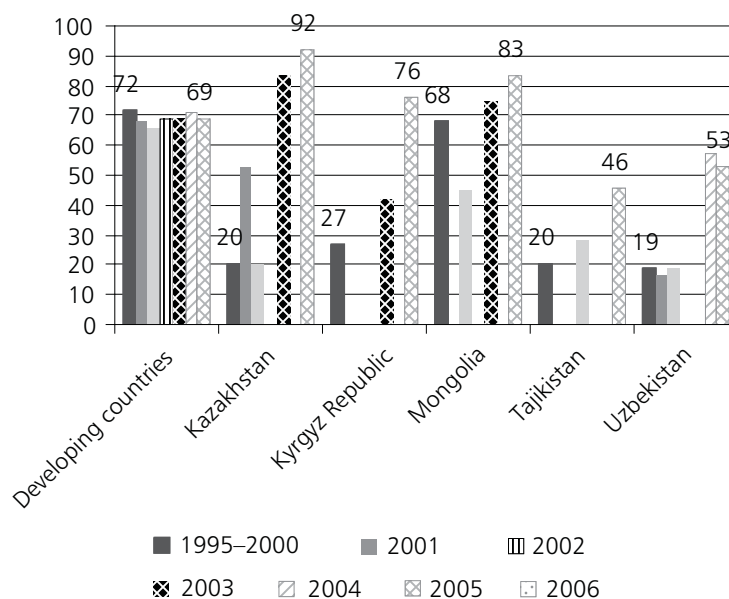
The extent of fortified salt distribution and consumption differed among the participating countries.

Figure 2.2: Annual Iodized Salt Production as Percentage of Annual Salt Consumption in Central Asia and Mongolia, 2003–2007



Source: ADB. 2008. *Sustainable Food Fortification in Central Asia and Mongolia Implementation Completion Report*. Consultant's report. Manila. Data source: country project reports.

Figure 2.3: Percentage of Households Using Iodized Salt in Central Asia and Mongolia in 1995–2006 Compared to World Averages



Source: ADB. 2008. *Sustainable Food Fortification in Central Asia and Mongolia Implementation Completion Report*. Consultant's report. Manila. Data source: country project reports, and UNICEF *State of the World's Children* reports, 2001–2008.

In Kazakhstan, salt production was concentrated in a few large private companies. Two of them were initially involved and a third, new, company later joined. One was given technical assistance under

the initiative, which contributed to the quality of its production.

In the Kyrgyz Republic, the number of medium-sized, sustainable salt companies increased

to 12, which ensured the production of 80%–90% of national demand. The remainder was imported from other Central Asian countries.

Mongolia established a reasonable balance between supplying quality iodized salt imported from the People's Republic of China to central areas, and domestically produced iodized salt to remote provinces. The initiative supported the construction of two salt factories at salt deposit sites in remote provinces, which helped improve the quality of the salt produced.

In Tajikistan, one company produced almost enough iodized salt to meet national demand. However, illegal noniodized salt still dominated local retail markets.¹⁷

Uzbekistan promoted establishment of a few modern salt companies and improved the quality of the iodized salt produced by existing salt factories. By 2007, there were 60 salt producers, of which the 13 participating salt producers provided two-thirds of national production.

Most participating countries have developed a national database covering their iodized salt programs. All conduct regular surveys to assess iodized salt coverage with assistance from UNICEF, the CDC, and other international agencies. ADB financed the Community-Based Early Childhood Development Project in the Kyrgyz Republic, which annually monitored household use of iodized salt in remote districts. Results of salt testing for iodine are often collected as one of the indicators in broader-based health and nutrition surveys, such as demographic and health surveys and MICs.

Fortified Flour Production

Unlike salt iodization, for which potassium iodate is the standard fortificant, for flour fortification a premix had to be developed prior to production. The following considerations helped determine what levels and sources of micronutrients to add.

- **Impact:** Amounts and sources added must be capable of producing a significant positive impact.
- **Safety:** Amounts and sources added should not cause potential harm.
- **Sensory:** There should be no adverse effect on the color, shelf life, baking properties, or consumer acceptance.
- **Cost:** Costs to the producer or consumer should be reasonable and acceptable.

KAN developed a new premix for wheat flour, based on recommended dietary intakes, nutritional requirements and deficiencies in the region, and cost. The premix contained electrolytic iron, zinc, folic acid (vitamin B₉), and three other B vitamins: thiamin (vitamin B₁), riboflavin (vitamin B₂), and niacin (vitamin B₃). All the participating countries adopted this flour premix, called KAP Komplex 1.¹⁸

The amount of each micronutrient to add was calculated to be the amount sufficient to make up for the shortfall between the estimated normal intake of these six micronutrients within the region and their recommended dietary intakes, for an average flour consumption of 260 grams per person per day. Minimum standards were developed for use of the flour premix, as shown in Table 2.2. These standards were used in regulations in all the participating countries.

To achieve the maximum impact in the shortest time, the initiative began fortification at mills with production of more than 200 tons per day. When the first project was designed, there was almost no data on flour mills in the region. Once fortification started, however, project teams in countries, regions, and ADB realized that large-mill production was not necessarily the best option. In the Kyrgyz Republic and Tajikistan, only medium-sized mills were functional. By the end of the first project, medium-sized mills in the Kyrgyz Republic, Mongolia, and Tajikistan were brought into the project.

¹⁷ While some of the salt produced in Tajikistan was exported to neighboring countries, this still could not fully explain the gap between the amount of iodized salt produced and the amount apparently consumed in the country.

¹⁸ Vitamin A was not included because of its impact on cost and the belief that other foods, such as vegetable oil and margarine, were more appropriate and cost-effective carriers for this vitamin. Vitamins B12 and B6 were not considered at the time because not as much was known about them in regard to flour fortification as is known now. Had the fortification been devised today, vitamin B12 may have been included.

Table 2.2: Ingredients of KAP Komplex 1
(ppm)

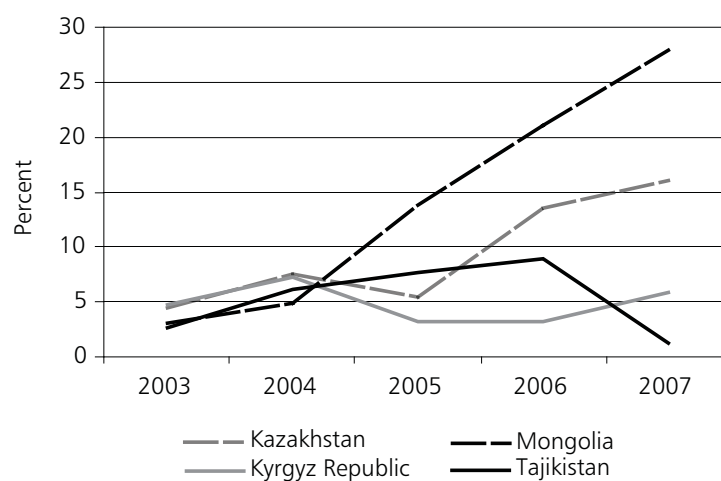
Micronutrient	Added ^a	Natural	Total	Standard
Thiamin (vitamin B1)	2.0	2.0	4.0	3.3
Riboflavin (vitamin B2)	3.0	0.4	3.4	2.8
Niacin (vitamin B3)	10.0	12.0	22.0	18.0
Folic acid (vitamin B9)	1.5	0.2	1.7	1.5
Iron (electrolytic)	50.0	14.0	64.0	55.0
Zinc	22.0	7.0	29.0	25.0

ppm = parts per million.

^a By KAP Komplex 1 premix added at 150 grams per ton.

Source: ADB. 2009. *Promoting Wheat Flour Fortification in Central Asia and Mongolia, 2001–2007. Experiences of Japan Fund for Poverty Reduction (JFPR) JFPR9005 and JFPR9052*. Consultant's report. Manila.

Figure 2.4: Annual Fortified Wheat Flour Production as Percentage of Annual Wheat Flour Consumption in Central Asia and Mongolia, 2003–2007



Source: ADB. 2008. *Sustainable Food Fortification in Central Asia and Mongolia*. Implementation Completion Report. Consultant's Report. Manila. Data source: country project reports.

Fortified wheat flour production reached the targeted amount only in Mongolia, although it increased in Kazakhstan and continued in the Kyrgyz Republic and Tajikistan (Figure 2.4). Uzbekistan, which received the support of the Global Alliance

for Improving Nutrition for flour fortification, did not receive the second JFPR project's support for flour fortification, and, hence, is not included in Figure 2.4. However, Uzbekistan's national wheat flour fortification program increased the number of

participating mills and used the standard procedures in wheat flour fortification, premix formulation, and quality assurance and control (QAC) as developed under the initiative.

Although the projects did not achieve their own targets, compared with other areas the participating countries have made remarkable progress. When the initiative began, some Eastern European countries were showing an interest in flour fortification but had been unable to get anything started, largely due to a lack of external support. Brazil had been working on a program and began fortifying flour in a few mills in 2004, but not to the extent accomplished in Central Asia. Argentina had adopted flour fortification standards but had no mills fortifying flour. Morocco had not yet started fortifying flour, and Egypt had been arguing about fortification for 20 years.

South Africa began working on fortification several years before the initiative and is now fortifying

most flour, but this is a single country with large, modern flour mills.

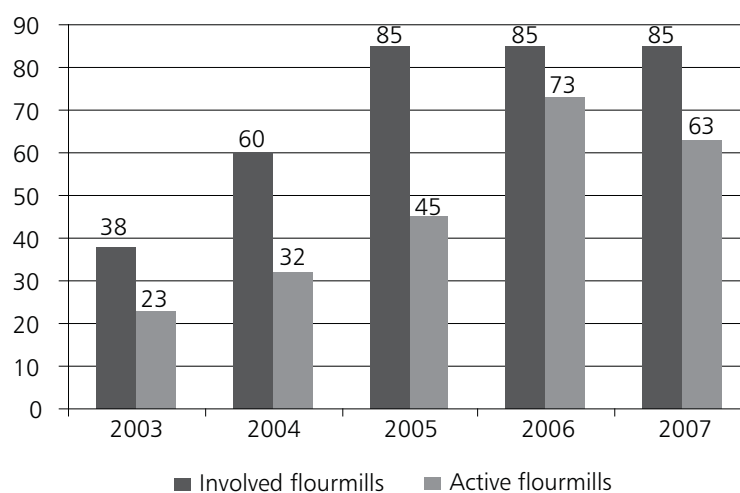
Across the region, the number of participating flour mills doubled during 2003–2005 and remained stable (Figure 2.5).

Quality of Fortified Foods

Delivering safe, quality fortified foods to consumers requires an elaborate QAC system. One of the initiative's challenges was to establish such a system in each country, according to a QAC framework recommended by the Pan American Health Organization (Figure 2.6).¹⁹

The QAC system needed internal control by the producers and external control by the governments' inspection agencies, and often by consumer groups, at each stage of fortification and delivery, as well as technical capacity at reference laboratories, food producers, and government inspection agencies. Also, the initiative quickly discovered a need to improve

Figure 2.5: Number of Participating Flour Mills in Central Asia and Mongolia, 2003–2007

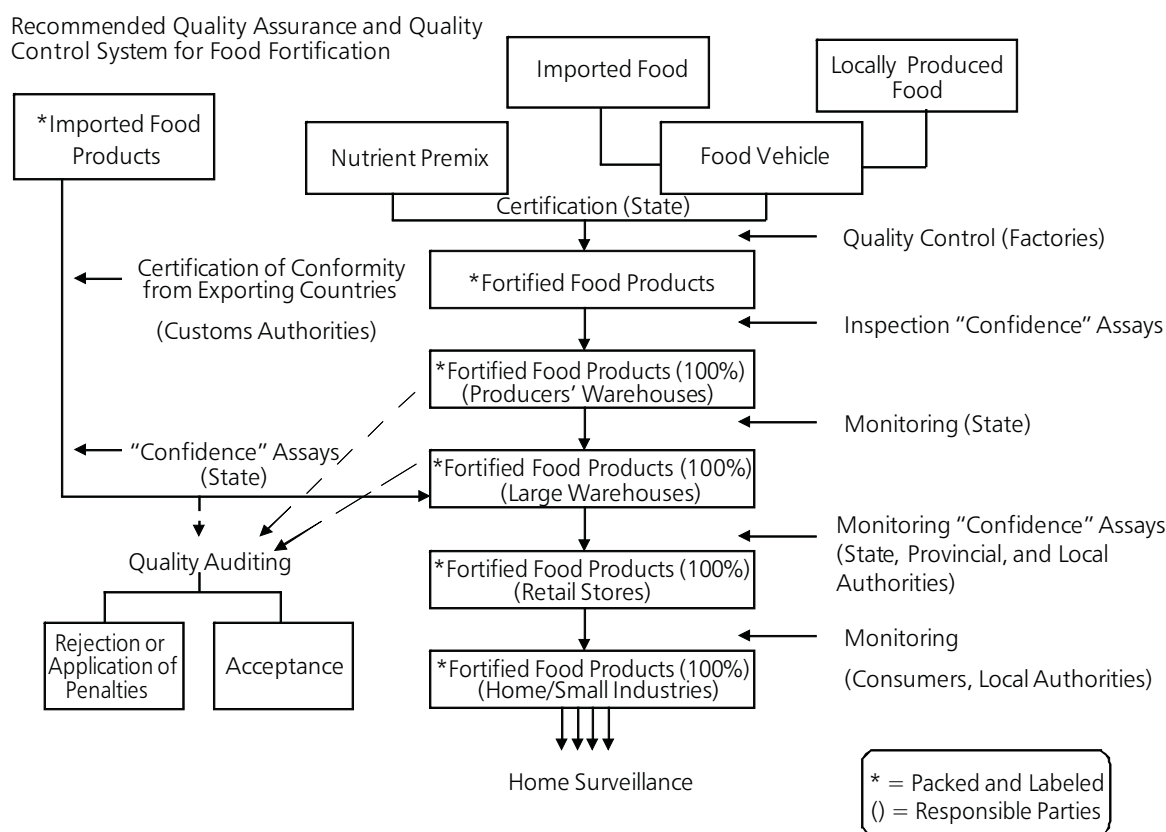


Note: Involved mills have officially committed to fortifying flour; active mills have officially committed to and are actually fortifying flour.

Source: ADB. 2008. *Sustainable Food Fortification in Central Asia and Mongolia*. Implementation Completion Report. Consultant's report. Manila. Data source: country project reports.

¹⁹ Further details on QAC mechanisms for flour fortification are available in ADB. 2009. *Promoting Wheat Flour Fortification in Central Asia and Mongolia, 2001–2007. Experiences of Japan Fund for Poverty Reduction (JFPR) JFPR9005 and JFPR9052*. Consultant's report. Manila. Available: www.adb.org/Documents/Reports/Consultant/37721-REG/37721-REG-TACR.pdf

Figure 2.6: Pan American Health Organization Guidelines on Quality Assurance and Control for Food Fortification



Adapted from: Food and Nutrition Program, Division of Health Promotion and Protection, Pan American Health Organization.

border control of imported salt, as the countries proceeded to ban importing noniodized salt.

The initiative provided laboratory equipment and necessary reagents as well as training for laboratory and sanitary epidemiological service (SES) technicians, which are inspecting agencies in the custom offices of Central Asian countries.

Iodized salt in final product form should contain at least 15 ppm of iodine. The initiative helped governments update salt iodization standards to conform to this standard, and helped the countries in their QAC activities. The QAC for iodized salt was carried out at production sites, retail shops, markets, and households. SESs regularly inspected

salt produced and, in some cases, salt sold at markets. In the Kyrgyz Republic, however, SESs were allowed to inspect food producers only once a year, which is insufficient for enforcing quality standards. More than 42,000 samples from production sites and about 745,000 samples at retail shops and households were tested in 2003–2004 alone, using different test methods—titration, WYD iodine checkers,²⁰ and salt test kits. The results varied depending on the method used. Thus, strict comparisons between 2003 and 2004, or between results at production sites, retail shops, and households, are not possible. In general, the data showed that the majority of samples had adequate iodine level at production sites.

²⁰ Hand-held instruments that measure the salt iodine content.

Kazakhstan and Mongolia were able to maintain adequate iodine levels from production sites to retailers and households, but in other countries salt tested at retailers and households had less iodine than did salt at production sites. This indicated not only improper packaging and storage (without which iodine content gradually declines), but also the fact that noniodized or poorly iodized salt was still available in the market from illegal sources that were not inspected by the SESs and that some people still used free salt from nearby salt deposits.

Flour fortification quality was tested by the iron spot test, which is a simple and semiquantitative procedure used all over the world to check whether a flour sample has roughly the right amount of added iron. That, in turn, denotes whether the flour is being properly fortified. Most tests were done by laboratories in the flour mills.

Each country handled external quality control of fortified flour differently, with KAN providing product testing for all the countries. Kazakhstan and Mongolia designed and adopted the procedures for monitoring of production, import, and sale of the fortified wheat flour, whereas the Kyrgyz Republic, Tajikistan, and Uzbekistan worked from existing sanitary regulations and norms.

In general, procedures included control on

- (i) compliance of the fortificants (and/or premix) with the existing standards,
- (ii) adequacy of the flour fortification method,
- (iii) vitamin and mineral content in the final product, and
- (iv) compliance of the packaging and labeling with existing standards.

For external monitoring, Uzbekistan used the central Uzdonmakhsulot Milling group in Uzbekistan and SES laboratories; Kazakhstan used the League of Grain Processors and Bakers of Kazakhstan and the SES. The Kyrgyz Republic relied on the Independent Bread Inspection Laboratory, Mongolia relied on Special Governmental Inspection, and Tajikistan relied on a private laboratory that had a contract with the association of food producers in Tajikistan.

Only Uzbekistan routinely ran quantitative iron and niacin tests using sophisticated equipment. These were done early in the initiative by the American Ingredients Company (which was a competitively

selected supplier of the premix), KAN, and the SES.

Beginning results showed erratic levels of minerals in fortified flour samples, consistent with expectations for any new program and the level of milling technology used in Central Asia. Much of the variation came from erratic flow of flour through the mill. The problem was mostly underfortification. Occasional spikes of overfortification would not have caused any safety alarm for human intake because the fortification standards were set low enough.

The accuracy of both mill dosing and quantitative testing was expected to improve with experience. International experts concluded that, until the matter was resolved, spot tests were the best method of quality testing for emerging flour fortification programs, and have modified their advice to other countries accordingly.

Affordability of Fortified Foods

At the beginning of the initiative, many consumers complained that iodized salt was much more expensive than noniodized salt, making it unlikely that the poor would buy iodized salt. Country project offices (CPOs) regularly checked prices of iodized salt in the market. Observations showed that by the end of the first JFPR project, the price of iodized salt came down as production increased, and the complaint about the high price disappeared. The problem remained, however, in some pockets around open salt deposits in Mongolia and Tajikistan, from which people took salt freely.

Indeed, producers were more worried about costs than consumers. Millers and bakers faced a significant up-front charge, especially for the flour premix. Experience in other countries suggested that the industry might resist flour fortification if its cost exceeded \$1 per ton of flour. Experience had also shown that the premix accounted for about 90% of the cost of fortification, so the project's goal was to keep the fortification cost at around \$0.90 per ton.

The final cost to the mill turned out to be \$0.97 per ton of flour when added at 150 grams per ton, or \$0.78 per ton when added at 120 grams per ton as later recommended for first-grade flour. By 2008, the cost of the premix had increased to about \$1.10 per ton of flour, but the price of flour had more than doubled by then, decreasing the proportional cost of fortification.

Private Sector Investment

The mandatory nature of salt iodization, prescribed by all participating countries by the end of the initiative, meant that there was a level playing field for the salt industries. Thus, all producers had to include fortificant at the standard rate. This helped them overcome earlier fears about increased production costs, which, in any case, were to be passed on to consumers.

In contrast, flour fortification, being the first large-scale trial in the region, needed time to prove its efficacy and remained voluntary in most of the countries. All participating countries started working toward mandatory flour fortification in the last 2 years of the initiative. By November 2009, Kazakhstan and the Kyrgyz Republic had mandatory flour fortification legislation.

As the initiative progressed, the participating producers of both salt and flour increased their investments in fortification, not only in the fortificant

(which was initially subsidized), processing, and packaging, but also in contributions to strengthening testing laboratories, training personnel, and social marketing. This trend is shown for fortified salt in Figure 2.7. The cost of flour fortification was about 0.5% of total processing costs and resulted in a barely noticeable increase in cost to the final consumers.

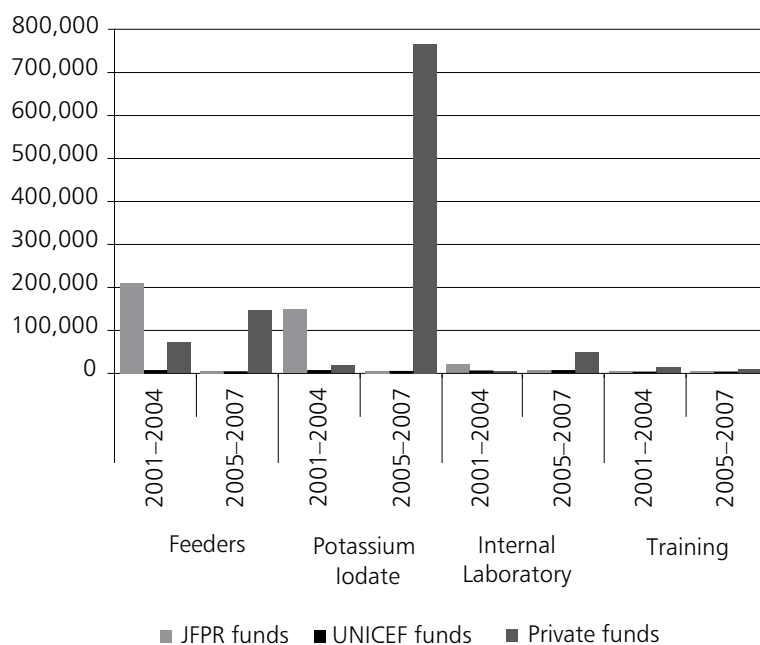
Since the end of 2007, a private company in Kazakhstan has been producing premix in Kazakhstan. Regional capacity for premix production helps easy procurement by Central Asian countries.

Legal and Regulatory Framework

Common Fortification Standards

The initiative aimed at and, to a large extent, achieved establishing a set of unified (or harmonized) national laws, regulations, and standards to (i) ensure the essential quality of the fortified foods,

Figure 2.7: Share of Grant and Private Industry Costs of Iodized Salt Production in Central Asia and Mongolia in 2001–2007 (\$)



JFPR = Japan Fund for Poverty Reduction, UNICEF = United Nations Children's Fund.

Source: ADB. 2008. *Sustainable Food Fortification in Central Asia and Mongolia*

Implementation Completion Report. Consultant's report. Manila. Data source: country project reports.

(ii) protect the consumer from fraud, (iii) provide the legal authority an adequate legal framework for the food-control activities, and (iv) strengthen the incentives for food producers and traders for cross-border and countrywide trade of fortified foods. A catalog of laws and regulations adopted during the initiative is shown in Appendix 5.

Under the umbrella of the initiative, all the participating countries agreed on a set of standards and made regulations and laws accordingly. Adoption of common standards took place in about 2 years—an impressive achievement. No one had attempted a uniform set of fortification standards for this large region before, except in Central America. A single premix and uniform set of fortified flour standards should be used, rather than allowing each country to set up its own standards and premix, and it required all the participating countries to write their regulations and laws accordingly. Common standards simplified procurement of fortificants and helped reduce cost. They also helped free trade of fortified salt and flour within the region.

Universal Salt Iodization Laws

One of the initiative's biggest achievements was having all participating countries adopt universal salt iodization (USI) laws during its term.²¹ The initiative helped the countries develop and adopt the laws and regulations required to enforce USI. The laws provide a level playing field for all producers, while holding them accountable for production of iodized salt and preventing import of noniodized salt.

Some countries had laws on salt iodization that were incomplete and allowed import of noniodized salt. These were amended during the project. In Mongolia, 10 food fortification standards, the National Strategy on Prevention of IDD, and the Law on Salt Iodization and Prevention of IDD were approved, and the National Program on Prevention of IDD was revised. Tajikistan's law, however, contained a loophole prohibiting the sale of noniodized salt while allowing production of noniodized salt. This made it difficult to hold producers accountable.

Mandatory Flour Fortification Laws

Flour fortification began on a voluntary basis in all the participating countries, and they worked toward making it mandatory. Although some national projects elsewhere began with a mandatory program (e.g., Indonesia, Ghana), this was not possible in Central Asia. An initial voluntary period was needed to allow the milling industry and consuming public to become familiar with fortification of a food staple and then to accept it, and also to demonstrate the efficacy of fortified flour.

Most aspects of flour and bread production were under centralized government control during the Soviet period. Technical standards, procedures, and specifications for flour production were inherited by the emerging Central Asian countries, which made changing regulations to allow fortification of flour and bread a slow and difficult process. The lack of relevant international expertise on fortification meant it was necessary to design new legislation, which delayed enactment of the enabling regulations. The first task was to set up regulations to allow fortification equipment and premix to be brought into the countries, preferably with reduced or eliminated tariffs and taxes. Most countries were still working toward legislation for mandatory flour fortification at the end of the initiative. The President of the Kyrgyz Republic approved legislation on mandatory flour fortification in March 2009.

In Kazakhstan, wheat flour fortification was once mandatory but was changed to voluntary in 2007 in response to political pressure from the ministries of agriculture and trade. Nevertheless, most of the participating flour mills (14 of 16) continued fortified-flour production, although the amounts remained less than needed. KAN and the League of Grain Processors and Bakers of Kazakhstan started to design provisional company regulations on fortification. Kazakhstan made flour fortification mandatory again in September 2009.

In contrast to the achievements described above, little progress was made in promoting regional trade in fortified flour. Inadequate infrastructure,

²¹ Uzbekistan is the only country that did not adopt a USI law during the first project. Thus, adoption of the law was a condition for Uzbekistan to participate in the second project. Uzbekistan finally approved the law in 2007.

resource constraints, and weak institutions remain barriers to realizing greater benefits from increased trade in fortified foods. To dramatically improve the availability of fortified flour, it would be more efficient and practical for some countries to import fortified flour instead of importing wheat from Kazakhstan and trying to fortify it domestically.

Advocacy, Communication, and Mobilization

The countries adopted USI legislation and other important regulations because of extensive advocacy by the initiative. Through marketing activities, the participating countries obtained the support of decision makers and other stakeholders down to community members. Coordinating each tier of communication activities, from policy level to community level, ensured that the right messages were available at the right time.

Sometimes the countries' advocacy achievements were diminished by changes made by decision makers, and also by counterattacks from interest groups. The experience taught that advocacy efforts must be continuous in order to maintain political support for food fortification.

Television (TV), radio, newspapers, and even technical literature promoted nutrition education and the advantages of fortified food. In Kazakhstan, the Ministry of Culture and Public Information funded regular broadcasting of fortified food advocacy telecasts by national public TV channels. In the Kyrgyz Republic, private TV companies gave free broadcasting time for fortified food advocacy materials. In Mongolia, the initiative supported a documentary on food fortification activities, which was shown at prime viewing time on national TV channels. In Mongolia and Uzbekistan, regular TV lessons were designed with the help of nutritionists and journalists. In the Kyrgyz Republic, Mongolia, and Tajikistan, the popular broadcasting channels transmitted messages on the benefits of fortified food. In all, the media coverage of fortification issues totaled 90 telecasts, nearly 150 articles in newspapers and magazines, and about 60 academic publications during the initiative.

Motivating the key players in fortification was a major task. Numerous nongovernment organizations

(NGOs), officials, and volunteers spent many hours in activities supporting the initiative in communities and sometimes at much higher levels, often with no compensation. It helped to involve the players in producing communication support materials. Mongolia was especially good at involving a wide range of experts and overseeing their professional contributions in developing materials. The most impressive were technical books for physicians, a technical manual on fortification, and manuals on quality assurance. Materials developed within the initiative have been used in orienting other groups, ranging from medical and health staff throughout the country to workers in flour and salt production, and pre-service educators.

Testing with salt test kits became a powerful social mobilization tool, involving health workers, school children, retailers, consumer associations, and NGOs. The best example was in the Kyrgyz Republic, where the Red Cross started a mass campaign on salt testing in Naryn oblast. Communities tested salt; if it was found to be noniodized, they sent it back to the producers and demanded replacements. The initiative expanded the mass campaign to other oblasts, together with another ADB-financed project, the Community-Based Early Childhood Development Project. In some cases, salt industries were closed down by government order for producing noniodized salt.

The initiative created a “healthy food” logo (shown below), which was adopted by all participating countries as part of the packaging or labeling. The initiative also supported food fortification advocacy based on the logo, which helped marketing efforts of the participating food industries. Logo use by food producers is usually regulated by each country's associations of food producers.



Also, Russian-language and English-language websites were set up to provide reference material and project information to stakeholders.

Each country demonstrated good practices in organizational motivation. For example:

- Retail salt sellers in the Kyrgyz Republic became much more active selling iodized salt after they became involved in testing their salt for iodate content.
- Technicians at a flour mill in Ulaanbaatar, Mongolia, refabricated a broken gear in a feeder to quickly bring fortified flour production back on line. One flour mill purchased its own micro-feeder and others requested technical assistance in locating such equipment.
- A mill in Astana, Kazakhstan, independently carried out a major marketing effort for fortified flour when project social marketing activities were delayed.

Kazakhstan was an early leader in awareness campaigning (Box 2.1).

There was also campaigning opposing fortification. Box 2.2 relates how opposition from just one organization or influential individual can cause setbacks and cripple months or years worth of work.

Capacity Development

Rather than relying on foreign or international expertise, the initiative developed a cadre of trained personnel in both the public and private sectors in the participating countries. This approach partly explains initial delays in project implementation, but it helped forge strong ownership by participating

Box 2.1: Kazakhstan's Successful Iodine Deficiency Disorders Awareness Campaign

As soon as Kazakhstan's national fortification plan was in place, the Kazakh Academy of Nutrition, along with the Healthy Life-Style Promotion Center and selected public relations firms, produced educational and communications materials about iodine deficiency disorders (IDD) and anemia prevention for pretesting in small focus-group interviews with their specific target groups. After adjustment, the materials were tested during the second half of 2003 in pilot areas of South Kazakhstan oblast. The campaign also included TV features, press conferences, presentations, and training seminars for nongovernment organization (NGO) employees, mass media, and salt and flour product dealers.

The message about the preventive effect of using iodized salt was aimed at large population groups, using the resources of the health care and education sectors, the mass media of the region, and NGOs. The campaign delivered numerous sets of 12 kinds of printed and video products about iodized salt with specific messages to the target audiences: local authorities; salt enterprises and traders; state employees in primary health care and sanitary services; middle schools, colleges, and universities; young school children, teenagers, and pregnant women; mass-media workers; and the general public. Especially in rural areas, these groups were enlightened about the dangers of iodine deficiency and the desirability of consuming iodized salt, educated in the principles of iodized salt storage and use during cooking, and informed about the "Healthy Food/*Sapaldy Azdyk*" general trademark.

At the end of 2003, assisted by the initiative and the Kyrgyz Red Cross, monitoring surveys and population interviews were conducted on the quality of iodized salt among 91,000 rural and urban households in South Kazakhstan oblast. The results indicated that awareness of IDD and use of iodized salt among the population had improved from 43% to 61%. Virtually all respondents had heard about iodized salt and knew the advantages of using it. Only 3% of households were still using noniodized salt. These results formed the basis of a comprehensive national campaign during 2003–2004, with a follow-up stage that continued into 2006.

Source: ADB. 2009. *Promoting Universal Salt Iodization in Central Asia and Mongolia, 2001–2007. Experiences of Japan Fund for Poverty Reduction (JFPR) JFPR9005 and JFPR9052*. Consultant's report. Manila.

Box 2.2: Opposition to Mandatory Flour Fortification

Kazakhstan passed mandatory flour fortification legislation in October 2004 but rescinded it in 2007, primarily because of trade issues and resistance from some millers. A major flaw of the 2004 flour fortification law was that it did not have strong involvement or support of the milling industry. The National Fortification Alliance, in particular the Kazakh Academy of Nutrition as a key member of the alliance, used its influence to get the law passed. One motivation in pushing for rapid passage of the law was the hope of winning a grant from the Global Alliance for Improving Nutrition. When a grant was subsequently declined for the second time, some industry and government support for a mandatory law was lost. There was also strong opposition from the minister of agriculture. However, Kazakhstan made flour fortification mandatory again in September 2009.

Source: ADB. 2009. *Promoting Wheat Flour Fortification in Central Asia and Mongolia, 2001–2007. Experiences of Japan Fund for Poverty Reduction (JFPR) JFPR9005 and JFPR9052*. Consultant's report. Manila.

countries and country project offices (CPOs), and improved their capacity development. It also promoted centers of excellence, such as the Kazakh Academy of Nutrition (KAN), in these countries, helping to create a solid and broad foundation for sustained food fortification in the region.

Salt and Flour Processors

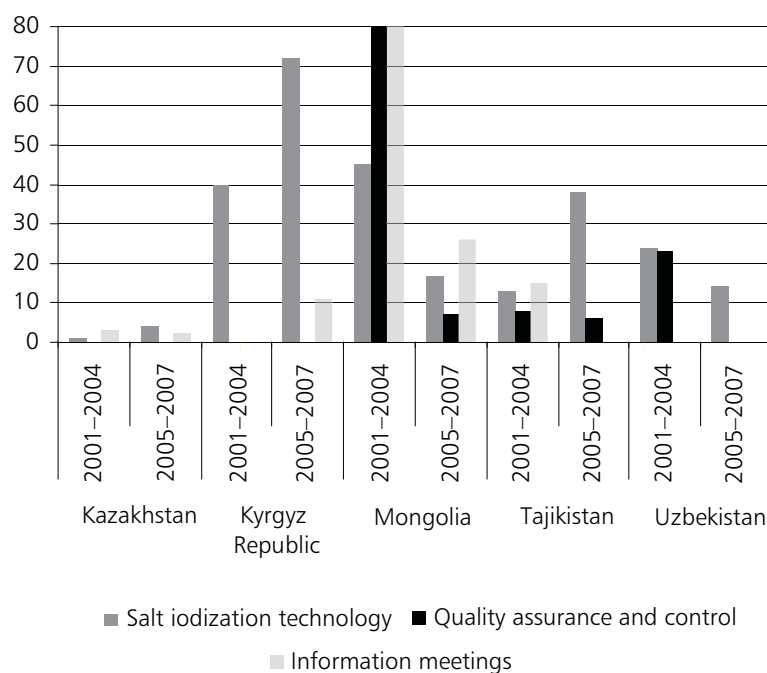
The initiative helped improve the production systems for fortified salt and flour by providing feeders, packaging equipment, and initial supplies of fortificants to participating salt industries and flour mills. It supported technical assistance among producers by (i) helping form producers' associations, which became active in solving the technical problems of individual producers; (ii) training industry personnel; and (iii) designing and lobbying for legislation, regulations, and standards. By the end of the first project, some milling consultants started assisting millers in other participating countries.

The initiative further ensured adequate training of technical staff through national and regional workshops. These provided practical guidance on the national legislation and regulations, while regional training focused on international best practices in fortification. These training events are summarized in Figures 2.8 and 2.9.

The initiative also worked to strengthen associations of salt producers and flour mills. All participating countries had associations, except Uzbekistan where flour mills were partly government-owned joint-stock companies. Associations were provided with quality-monitoring equipment by the project to help their member food producers, and were trained in installing equipment. The associations in the participating countries were relatively weak, and their capacity varied by country. Tajikistan's association has continued to manage a revolving potassium iodate fund for its members even after the initiative's support ended, while the Kyrgyz salt association's work slowed down when it had a change of leader. The League of Grain Processors and Bakers of Kazakhstan is relatively strong and advocated for establishing a regional flour mill association towards the end of the initiative, which was generally welcomed by associations in the other countries. Such a regional association would surely contribute to promote flour fortification in the region.

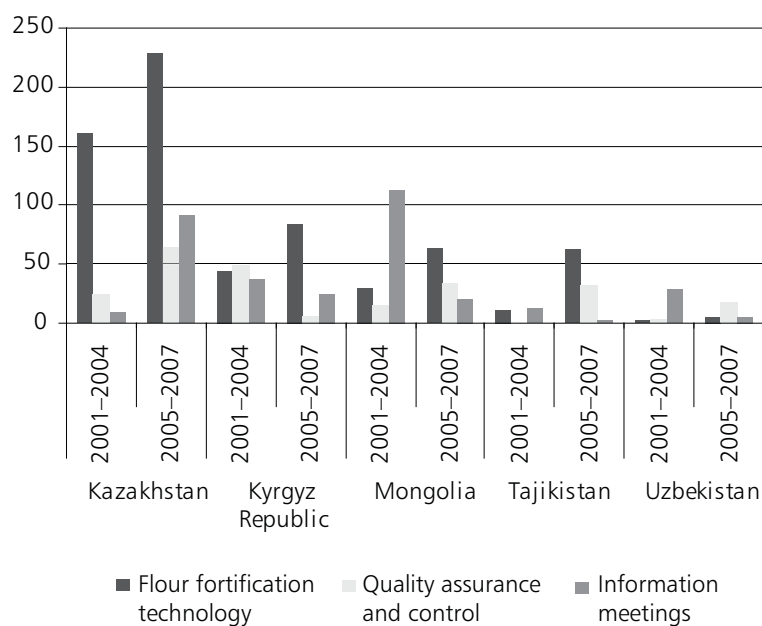
UNICEF, in cooperation with the CDC, conducted regular training on quality assurance and monitoring of iodized salt in all the countries throughout 2004–2007. Also, UNICEF, in cooperation with the International Association of Operating Millers, the CDC, and the Flour

Figure 2.8: Numbers of Salt Engineers and Laboratory Technicians Trained in Central Asia and Mongolia, 2003–2007



Source: ADB. 2008. *Sustainable Food Fortification in Central Asia and Mongolia Implementation Completion Report*. Consultant's report. Manila. Data source: country project reports.

Figure 2.9: Numbers of Flour Mill Engineers and Laboratory Technicians Trained in Central Asia and Mongolia, 2003–2007



Source: ADB. 2008. *Sustainable Food Fortification in Central Asia and Mongolia Implementation Completion Report*. Consultant's report. Manila. Data source: country project reports.

Fortification Initiative, conducted regular training on quality assurance and monitoring of fortified flour in all the participating countries through regional meetings of the International Association of Operating Millers and national workshops.

Regulatory Authorities

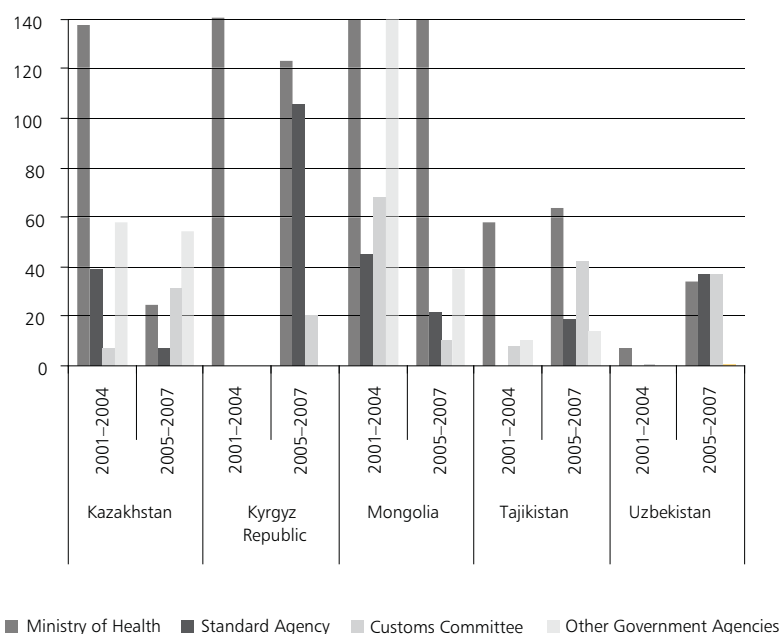
The initiative increased the capacity of government control agencies to ensure adequate tests of fortified food samples through procurement of laboratory equipment and reagents. More than 4,000 representatives from the sanitary epidemiological services (SESs), customs services, and other control agencies were trained at national and local workshops. Around 28,000 salt test indicators were distributed among NGOs and retailers to monitor salt iodization in markets and households. In Mongolia, as a result of institutional reform, the Specialized Inspection Agency was established in 2006; in other participating countries, regulatory control is through interaction between the standards agency, the SES, and the customs service. Figure 2.10 provides an overview of the training events and capacity building for the various control agencies.

The regional workshops and training by the CDC and UNICEF constituted a powerful capacity development exercise for the region. These organizations provided the framework for project development in all the countries, set the stage for regional cooperation, and provided necessary skills in project activities.

Nongovernment Organizations

Many NGOs benefited from their active roles in awareness building and social marketing. In Mongolia, for example, organizations such as the Mongolian Women's Federation, Consumer Rights Protection Association, Mongolian Medical Academy, and Family Education Association played leading roles in these activities, along with participating private companies. All were encouraged by the population's reaction to their efforts and believe that their reputation among the communities grew as a result of their involvement in the initiative. At the same time, the experiences made them more capable of sustaining the fortification program in their country.

Figure 2.10: Numbers of Staff of Control Agencies Trained in Central Asia and Mongolia in 2003–2007



Source: ADB. 2008. *Sustainable Food Fortification in Central Asia and Mongolia. Implementation Completion Report*. Consultant's report. Manila. Data source: country project reports.

3. Development Impact

Reduced Prevalence of Iodine Deficiency and Iron Deficiency

The adoption of universal salt iodization (USI) by all the participating countries, the rising production of iodized salt, and the growing number of households using iodized salt during the initiative indicate increased protection against IDD.

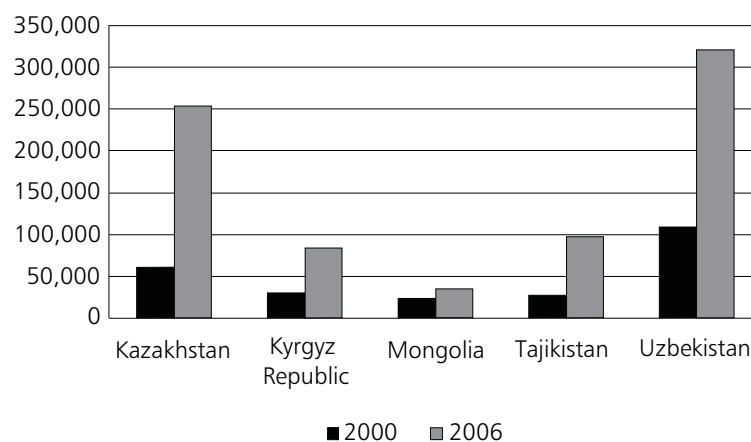
Initiative results show that almost 24 million new consumers of iodized salt were added in the population of Central Asia and Mongolia during the first Japan Fund for Poverty Reduction (JFPR) project, and an additional 500,000 newborns were protected against brain damage from iodine deficiency.

A simple scenario calculation by Frits Van Der Haar of Emory University suggests that the annual

savings to the combined national economies as a result of the initiative may have been as high as \$300 million. Table 3.1 gives country details of these data, and Figure 3.1 shows progress in the protection of newborns. The iodized salt coverage data were the latest data available as of 2000, 2004, and 2006. They may not be perfectly accurate but are the best data available.

The data show that, regionwide, the proportion of newborns protected against iodine-deficiency-caused brain damage increased 25% in 2000 to 59% in 2004 and to 63% in 2006. This means that, annually, 500,000 more newborns were protected due to the initiative's efforts than before the initiative began.

Figure 3.1: Number of Newborns Protected Each Year against the Risk of Brain Damage from Iodine Deficiency, 2000–2006



Source: ADB. 2009. *Promoting Universal Salt Iodization in Central Asia and Mongolia, 2001–2007. Experiences of Japan Fund for Poverty Reduction (JFPR) JFPR9005 and JFPR9052.* Consultant's report. Manila.

Table 3.1: Estimated Impact of Iodization on Iodine Deficiency Disorders Prevention

Country	Population (millions)	Percent of House- holds Using Iodized Salt			Annual Births (‘000)			
	Total	Protected Against IDD	%	Year	Per 1,000 Population	Total Number	Numbers	Numbers
		Protected					Unprotected	
Initiative Countries, end 2000 ^a								
Azerbaijan	7.7	3.3	43	2000	15	115	49	65
Kazakhstan	14.9	4.3	29	1999	14	207	60	147
Kyrgyz Republic	4.9	1.3	27	1997	22	109	30	79
Mongolia	2.5	1.1	45	1998	20	51	23	28
Tajikistan	6.4	1.3	20	2000	21	134	27	107
Uzbekistan	24.8	4.7	19	2000	23	570	108	462
Total	61.2	16.0	26	...	...	1,186	297	888
Initiative Countries, 2004								
Azerbaijan ^b	8.2	5.7	70	2004	14	115	80	34
Kazakhstan ^b	15.4	12.8	83	2004	17	262	218	44
Kyrgyz Republic ^c	5.1	3.0	59	2003	21	108	64	44
Mongolia ^c	2.6	1.9	75	2004	23	60	45	15
Tajikistan ^c	6.2	1.7	28	2003	31	194	54	139
Uzbekistan ^c	26.1	14.6	56	2003	23	600	335	265
Total	63.6	39.7	63	...	...	1,339	796	541
Initiative Countries, 2006 Situation ^d								
Kazakhstan	15.3	14.1	92	2006	18	275	253	22
Kyrgyz Republic	5.2	4.0	76	2006	21	109	83	26
Mongolia	2.6	1.9	75	2005	18	47	35	12
Tajikistan	7.0	3.2	46	2005	30	210	97	113
Uzbekistan	26.2	13.9	53	2006	23	603	320	283
Total	56.3	37.1	66	...	...	1,244	788	456

Note: Numbers may not sum precisely because of rounding.

^a Data from ADB Salt Situation Assessments; UNICEF; Population size and crude birth rates from UN Population Reference Bureau reports for the respective years.

^b Data from UNICEF; Population sizes and crude birth rates from the UN Population Reference Bureau reports for the respective years.

^c Data from Beijing Conference in 2003.

^d Data from multiple indicator cluster surveys (MICSs) in late 2005 and early 2006.

Source: ADB. 2009. *Promoting Universal Salt Iodization in Central Asia and Mongolia, 2001–2007. Experiences of Japan Fund for Poverty Reduction (JFPR) JFPR9005 and JFPR9052*. Consultant's report. Manila.

The initiative conducted sentinel studies, coordinated by KAN, on the effects of both salt and flour fortification on women and children in each country in pilot areas: a baseline study in 2003 (December 2002–April 2003), a 1-year follow-up study in 2004 (May–August 2004), and a 4-year follow-up study in 2007. The results for the major iodine-related indicators are summarized in Table 3.2, and for the IDA-related and folic-acid-related indicators in Table 3.3.

Comparing the 2003 and 2004 data for children shows the immediate effect of the increases in iodized salt supplies on the iodine status of children in all countries except Mongolia (Table 3.2). The values for

children in 2007 indicate that the improvements were sustained, and by then included Mongolia. Results for women were similar. The urinary iodine indicators for 2004 and 2007 show sustained improvements in women's iodine status, accompanied by the salt measurements, which suggest continuing improved access to adequately iodized salt between 2004 and 2007 in the sentinel sites.

UNICEF sponsored two national surveys near the end of the initiative—one in Kazakhstan in 2006 and the other in the Kyrgyz Republic in 2007. The surveys assessed the quality and use of iodized salt in households and the iodine nutrition status of a representative sample of the population.

Table 3.2: Urinary Iodine Measurements in Children 2–15 Years of Age and Women 15–49 Years of Age, by Country

Variable	Year ^a	Azerbaijan ^b	Kazakhstan	Kyrgyz Republic	Mongolia	Tajikistan	Uzbekistan
Children 2–15 Years: Comparative Data							
Urine Iodine/Iodine Deficiency (ID)							
Median (µg/L)	2003	154.7	104.5	78.8	68.8	29.1	109.3
	2004	308.1	246.8	133.4	58.6	94.2	246.8
	2007	323.5	187.9	...	118.6	119.8	136.8
ID, total (%)	2003	10.0	48.8	67.5	63.8	88.8	47.7
	2004	0.0	7.5	25.0	63.8	56.2	...
	2007	1.3 ^c	16.2 ^c	...	43.0 ^c	34.3 ^c	28.6
Mild	2003	7.5	28.8	37.3	27.5	16.3	16.3
	2004	...	7.5	18.1	20	45.2	...
	2007	1.3	12.1	...	31.7	31.4	20.2
Moderate	2003	1.3	12.5	13.3	26.3	42.5	14.0
	2004	...	...	2.8	33.8	11.0	...
	2007	...	4.1	...	11.4	2.9	8.3
Severe	2003	1.3	7.5	16.9	10.0	30.0	17.4
	2004	...	...	4.2	10.0	...	...
	2007	...	...	...	...	...	...
Women 15–49 Years: Comparative Data							
Median, total (µg/L)	2004	315.0	213.7	116.8	72.0	98.3	205.4
	2007	334.3	222.7	...	112.4	130.4	134.3
ID, total (%)	2004	2.5	15.4	30.8	60.0	54.5	5.0
	2007	2.0	19.4	...	40.0	19.3 ^c	25.7
Mild	2004	2.6	5.1	20.5	27.5	40.9	5.1
	2007	2.0	11.1	...	20.0	16.1	22.8
Moderate	2004	...	2.6	5.15	25.0	4.5	0.0
	2007	...	8.3	...	17.5	3.2	2.9
Severe	2004	...	7.7	5.15	7.5	9.1	...
	2007	...	...	...	2.5	...	...

µg/L = micrograms per liter.

^a Women were not included in baseline data; round 1 in Kazakhstan was carried out in December 2002, and 2002 data for this country are in the 2003 lines.

^b Round 3 in Azerbaijan was carried out in 2005, and 2005 data for this country are in 2007 lines.

^c $p < 0.05$ in comparison with baseline data (for children) or with round 2 data (for women). (p = probability of rejection of hypothesis.)

In Kazakhstan, iodine status reached an optimal level in 2005, and compared to similar data collected in 1999 showed that the outstanding improvement of iodine status in the population was associated with significant improvements in the use and quality of iodized salt in households—more than 90% of the sampled households were using adequately iodized salt.

The Kyrgyz Republic survey confirmed that much progress was achieved in improving the iodized salt supply and iodine nutrition status in the population, but revealed that pregnant women (not sampled in the Kazakhstan survey) were still not consuming enough iodine to satisfy their increased dietary iodine requirements.

Wheat flour fortification resulted in significant improvement in the micronutrient status of children and women in households where fortified flour was regularly consumed, according to the sentinel studies carried out during 2001–2007 (Table 3.3). While the studies were limited to a small group in each country, the reduction in anemia rates and severe folic acid deficiency were good evidence of the efficacy of the flour fortification. The detailed results have been published separately.²² In summary:

- Most of the women in the sample population were aware of fortified flour and most said they were using it.
- By 2007, the iron spot test showed that the flour used by most households (83%–100%) in all countries was fortified.
- Baseline data showed high initial rates of anemia in children and women, similar by country to World Health Organization (WHO) data.

- Overall anemia rates dropped from 42% to 34% in women and from 35% to 22% in children.
- Ferritin levels increased in both children and women, showing improvement in iron store status. The overall incidence of low ferritin levels in women dropped from 42% to 24%.
- Serum folate levels increased in both women and children. The overall level of severe folic acid deficiency dropped from 39% to 2% in children and from 13% to 2% in women.

Production and consumption of fortified wheat flour across the participating countries remain low. However, the practice of flour fortification has been firmly established in the region. While the amount of fortified flour being produced is low in comparison to total flour consumption, it is clearly making a valuable nutritional contribution to those people who consume it.

Flour fortification would need to be greatly expanded to achieve a measurable effect for the general population. Assessing the effect on IDA would be the hardest task, because this condition is influenced by a number of dietary factors apart from iron intake. Also, it takes years for improvement to occur and become statistically significant. A decrease in neural tube birth defects through reduction of folic acid deficiency would likely occur the fastest, based on experience in other countries.

Overall, the initiative's efforts are helping avert human capital and economic loss as discussed in the introduction.

²² S. Tazhibayev, et al. 2008. Evaluation of the Potential Effectiveness of Wheat Flour and Salt Fortification Programs in Five Central Asian Countries and Mongolia, 2002–2007. *UN Food and Nutrition Bulletin*. 29 (4). pp. 255–265.

Table 3.3: Anemia, Ferritin, and Folic Acid Measurements in Children and Women, by Country

Variable	Year ^a	Azerbaijan ^b	Kazakhstan	Kyrgyz Republic ^c	Mongolia	Tajikistan	Uzbekistan
Children 2–15 Years: Comparative Data							
Anemia (%)							
Total	2003	20.9	50.0	15.0	12.5	70.0	31.4
	2004	25.0	37.5	7.9	8.8	24.1	10.5
	2007	6.3*	32.4*	7.9	20.3	20.3*	16.7*
Mild	2003	18.6	38.8	13.8	12.5	40.0	29.1
	2004	23.7	33.8	7.9	8.8	20.3	10.5
	2007	6.3*	25.7	...	19.0	17.4	16.7
Moderate	2003	2.3	11.2	1.2	...	27.5	2.3
	2004	1.3	3.8	...	...	3.8	...
	2007	...	6.8	...	1.3	2.9	...
Severe	2003	...	...	...	...	2.5	...
	2004	...	...	...	...	...	...
	2007	...	...	...	...	...	...
Low ferritin level (%)							
	2003	15.2	43.8	4.9	5.0	8.7	8.1
	2004	48.7	53.8	51.2	52.5	47.4	5.1
	2007	16.3	22.9*	51.2	16.4	12.9	22.6
Folic acid deficiency (%)							
Total	2003	85.0	83.3	97.6	85.0	57.5	16.2
	2004	51.9	83.8	68.8	57.5	69.2	7.7
	2007	16.3*	18.9*	68.8	41.8*	4.4*	12.0
Mild	2003	28.8	20.5	13.4	47.5	21.3	10.5
	2004	29.1	56.3	32.5	27.5	33.3	6.4
	2007	12.5	18.7	32.5	39.3	2.9	10.8
Severe	2003	56.3	62.8	84.2	37.5	36.3	5.8
	2004	22.8	27.5	36.4	30.0	35.9	1.3
	2007	3.8	...	36.4	2.5	1.5	1.2

continued on next page

Table 3.3 *continued*

Variable	Year ^a	Azerbaijan ^b	Kazakhstan	Kyrgyz Republic ^c	Mongolia	Tajikistan	Uzbekistan
Women 15–49 Years: Comparative Data							
Anemia (%)							
Total	2004	69.2	57.5	33.3	10.0	33.3	51.3
	2007	50.0	27.8*	...	25.0	37.1	27.8
Mild	2004	64.1	45.0	30.8	7.5	28.2	43.6
	2007	47.5	19.4	...	22.5	37.1	16.7
Moderate	2004	5.1	10.0	2.6	2.5	5.1	7.7
	2007	2.5	8.3	...	2.5	...	11.1
Severe	2004	...	2.5	...	...	...	...
Low ferritin level (%)							
	2004	50.0	47.4	47.6	25.0	43.6	28.2
	2007	20.0*	25.0	52.6	20.0	22.8*	33.3
Folic acid deficiency (%)							
Total	2004	12.8	65.0	59.0	75.0	30.8	33.3
	2007	10.0	33.3	...	37.5*	17.2	24.1
Mild	2004	12.8	42.5	28.2	60.0	12.8	30.8
	2007	10.0	33.3	...	32.5	14.3	24.1
Severe	2004	0.0	22.5	30.8	15.0	17.9	2.6
	2007	...	...	...	5.0	2.9	...

sp < 0.05 in comparison with baseline data (for children) or with round 2 data (for women).

^a Women were not included in baseline data; round 1 in Kazakhstan was carried out in December 2002, and 2002 data for this country are in the 2003 lines.

^b Round 3 in Azerbaijan was carried out in 2005, and 2005 data for this country are in 2007 lines.

^c Round 3 in the Kyrgyz Republic was not carried out, and round 2 data for this country, which was conducted in 2004, are in the 2007 lines.

4. Development Issues, Lessons Learned, and Conclusion

Development Issues

As noted earlier, the initiative tested three main hypotheses: that public–private partnership can succeed in countries newly emerging from centralized economies, that fortified foods can be made affordable to the poor, and that a regional versus a country-by-country approach adds value to each country. The development results are discussed below.

Would Public–Private Partnership toward Sustainable Food Fortification Work in Countries Newly Emerging from Centralized Economies?

In most Central Asian countries, private industry was still emerging a decade after independence. Governments were grappling with degrees of control over private companies; the well-established networks of trade, communication, and energy supply among the former Soviet republics had largely disappeared. The reemergence of iodine deficiency disorders (IDD) was but one result of this fracturing.

Participating salt industries and flour mills signed agreements with their country's health ministry that stipulated their responsibilities in detail, including sharing one-third of the cost of fortificants. Tajik salt industries and flour mills were exempted from cost sharing because they were still recovering from the aftermath of civil war. The cost-sharing subsidy was intended as a start-up measure only—fortification had to become self-sustaining.

Thus, partnerships were made on paper from the beginning of the initiative. How did they translate into practice?

Engaging the private sector in the initiative's activities was a vital element for success. Collaboration helped to establish good working relations and strong

partnership with the salt industry and flour millers in all the countries. Through this involvement, the producers learned about the effects of micronutrient deficiency and gradually developed a sense of ownership of the fortification program, taking on an increasing share of production costs as the initiative progressed.

Salt producers and flour millers also demonstrated their sense of ownership by forming associations. In Mongolia, the Kyrgyz Republic, and Tajikistan, salt producers associations formed through the initiative later ensured the sustainability of production of quality iodized salt. In 2007, Kazakhstan was elected to be the first president of the board of the new Eurasian Branch of the International Association of the Operating Millers, which comprises the flour millers from 35 countries in Eastern Europe, the Middle East, and the Commonwealth of Independent States.

In Kazakhstan, the Kyrgyz Republic, and Mongolia, food producers associations led the process of fortification equipment installation, and later Kazakhstan and Mongolia flour millers started buying premix and feeders using private funds. In all the countries, private industry contributed to advertising the advantages of fortified food and made it a part of their marketing strategy. In Kazakhstan, for instance, two flour milling companies advertised the advantage of their flour and pasta, referring to its micronutrient content. In Mongolia, the food producers associations used the annual trade fairs in 2005–2007 to exhibit iodized salt and fortified wheat flour. In 2006, the Mongolian Consumers Association, in cooperation with the Grain Processors Association, conducted a special competition in quality fortified food. In addition, food producers helped in the design and adoption of many legislative documents and standards on

fortified food production and distribution.

In all the participating countries, the salt associations identified problems in their industries and discussed solutions with governments and the donor community. The associations also gave technical assistance to the industry on improving the quality of iodized salt and strengthening internal laboratory control. Further, they took an active part in training salt technology engineers and laboratory technicians. In the Kyrgyz Republic and Tajikistan, these associations led the supply of potassium iodate to salt producers.

In summary, the industry gradually accepted ownership of the fortification concept. If it had balked or refused to cooperate in the spirit of the initiative, the process would have taken much longer and there would have been many transgressions, while the public received conflicting messages from government and industry and lost enthusiasm about fortification.

Public-private partnership included civil society. For example, nongovernment organizations (NGOs) in Khatlon Province, Tajikistan, conducted a forum that discussed banning the production and sale of noniodized salt from the open salt deposits. The forum was supported by the government and international agencies, and was attended by senior government officials, local authorities, community leaders, food producers, and NGOs. It led to a significant increase in the use of iodized salt at local markets and in households.

Could Fortified Staple Foods Be Made Affordable for the Poor in Central Asian Countries and Mongolia?

Many voluntarily fortified branded products are unaffordable by the poor. A good example is fortified ready-to-eat breakfast cereal, which has widespread appeal and many health benefits. The poor usually spend their limited resources on basic, inexpensive food staples. Therefore, the initiative chose the most basic staples in the region—salt and wheat flour—for fortification.

Consumers are very sensitive to price increases of staple foods and a slight price increase could impede the demand for fortified foods. Thus, it was very important to contain the cost of fortification. Theoretically, the cost of potassium

iodate to iodize salt and the premix for enriching flour is negligible; in reality, food producers often increased food prices by more than just the cost of adding fortificants. In Mongolia, for example, retailers were selling iodized salt in 1997 (before the initiative) at \$0.32–\$0.50 per kilogram compared with \$0.13–\$0.35 per kilogram for common, noniodized salt. The cost of flour fortification was initially an unknown factor because it was a new concept for the region.

By the end of the initiative, the price increment throughout the region was minimal for iodized salt and negligible for fortified wheat flour. This resulted from (i) the mandatory nature of fortification across the region, which made a level playing field; and (ii) demand creation, which was carried out in parallel with the initiative's progress in production of fortified food and introduced economies of scale as production increased and demand rose.

In fortified flour, premix cost to millers was less than \$1 per ton of flour. There were no observed price differences between fortified and nonfortified flour in the market. The large difference in price between first- and second-grade flour, however, created a marketing obstacle. The initiative fortified first-grade flour, but most rural populations purchased second-grade flour. Second-grade flour contains a substantial amount of nutrients because it is less refined, but it is still deficient in bio-available iron and folic acid. The initiative had little trouble convincing urban populations who already purchased first-grade flour to switch to fortified flour, but found it difficult to convince rural populations to shift from second-grade flour to fortified first-grade flour.

Would There be Added Value to the Target Countries through a Regional Approach to Food Fortification?

The value-added question challenged ADB's method of operating in terms of leveraging support, coordination, and collaboration among its developing member countries. Two important aspects of the initiative came under scrutiny:

- Could regional developing-country standards in food fortification, and the policy and regulatory environment to enforce them, be created and implemented?

- Could regionwide demand for fortification to improve health be created?

Creating and Enforcing Region-wide Standards

The initiative expected that a regional approach would enable establishment of common standards for fortified salt and flour, achieve economies of scale, take advantage of cross-learning, and enrich interregional cooperation. ADB support on a country-by-country basis would not allow these advantages and be unable to address regional issues, such as trade and its regulation.

The earlier presence of a government and regulation system common to five of the countries, and their similar micronutrient problems (with Mongolia a close neighbor in economic links and dietary preferences with Central Asia), suggested that a regional approach to fortification would be logical. However, fortification standards for so large a region had not been attempted before, with the exception of Central America. All the participating countries had to agree on one set of standards and to set up appropriate regulations and laws.

Agreement by all the countries to use the same fortificants for salt and flour made design of common standards straightforward and was one of the most important contributions of the initiative. Most participating countries adopted mandatory legislation for iodized salt by 2004 (Uzbekistan adopted the universal salt iodization [USI] law in 2007), which also prohibited the importation of non-iodized salt for human consumption. All the participating countries have now adopted USI and similar national standards to ensure adequate salt iodization—all because of the initiative's continued advocacy.

Much capacity development was needed for the initiative's participating countries to become familiar with, and accept the need for, mandatory fortification and the accompanying regulations. First, factory capacity to produce the fortified foods in many cases had to be improved. Second, industry personnel needed to learn the benefits of fortification and best fortification practices, and to become familiar with existing or planned regulations to ensure full compliance. Third, government agencies, including regulatory authorities, needed help

preparing appropriate legislation and regulations on fortification for their country.

Failure in one component of the capacity development would have meant failure of the program in one country and a decrease in the regional benefits to the other countries. For example, the 2004 flour fortification law in Kazakhstan, which did not have the support of the milling industry, was temporarily rescinded in 2007 (Box 2.2). This discouraged other countries from pursuing mandatory flour fortification.

The final success of the initiative's regional approach to food fortification would be harmonization of trade regulations that allowed only correctly fortified, prescribed foods to cross borders in the region. The choice of common fortificants and their addition in the same standard proportions in all the countries have virtually assured regional harmonization, although not all the legislation, particularly for flour, is yet in place.

For countries that rely on imported flour, such as the Kyrgyz Republic, Mongolia, and Tajikistan, it is necessary to establish a regulatory framework, with incentives to import fortified flour, if the countries are serious about increasing their populations' access to fortified flour. The progress to date, however, has vindicated the regional nature of the initiative.

Creating Region-wide Supply and Demand

Demand for iodized salt across the participating countries increased substantially during the initiative. By the end of the first Japan Fund for Poverty Reduction (JFPR) project, 24 million new consumers of iodized salt were added in the population of Central Asia and Mongolia; household use of iodized salt reached 90% in Kazakhstan. Annual savings to the combined national economies from avoiding iodine deficiencies was estimated to be up to \$300 million. Demand creation for fortified flour was less universal, but where it was attempted, consumers responded and, as the sentinel studies showed, they benefited significantly.

Thus, the second question on the added value of the initiative's regional approach—could regionwide demand for fortification to improve health be created and capacity to meet the demand be built?—was answered positively through the initiative's advocacy, creation of new alliances, capacity building, motivation of stakeholder groups, and

social marketing. It turned out that participating countries were already heavily interdependent for meeting the need for wheat grains, flour, and salt. To keep fortification issues visible to government and industry, most participating countries designed and promoted wheat flour fortification laws, resulting to date in their approval by Kazakhstan and the Kyrgyz Republic.

The new alliances that formed between government policy makers, regulatory authorities, private food producers, private suppliers of fortificants and equipment, research and academic institutions, NGOs, and civil society were invaluable in creating a sense of ownership of fortification, developing effective strategies, and creating a positive attitude to nutrition—and hence demand for it. These need to be institutionalized to ensure their long-term viability.

Capacity building for stakeholders across the countries resulted in a firm basis for sustainable, national fortification capacity and regional cooperation to help meet regional demand.

The many communication tools aimed at consumers, from mass media to neighborhood volunteers, played a major part in creating demand. Uniformity of the fortification messages helped achieve a region-wide positive attitude to fortified foods amongst the public. The healthy food logo was one such unifying tool—a product of stakeholder motivation that now appears on packages of fortified products in all the countries. For the industry, it is an incentive that stimulates demand for a healthier product.

Lessons

Numerous lessons were learned during the initiative, some of which are discussed or implied in the earlier sections. In general, the initiative's achievements were made possible by the project design, which called for balanced attention to food production, quality assurance, structural reform, institutional capacity development, and communication for sustained demand. These wide-ranging tasks required careful preparation in each of the participating countries. The following summarizes what was learned.

Mandatory Fortification Legislation

Political support at the highest level is needed to ensure sustainability of food fortification programs. Voluntary fortification does not lead to the mass availability of fortified staple foods. Mandatory food fortification legislation, which creates a level playing field for all producers, is necessary.

Political Support

Food fortification to reduce public health problems must be supported by policy measures that provide incentives for fortifying foods and ensure the safety of the fortified foods. In addition, laws and regulations must be thoroughly implemented by the government control agencies. The initiative's experience shows that food fortification succeeds if (i) political will is demonstrated at the highest level, (ii) food and nutrition policy implementation is an integral part of national development policy, and (iii) a system for monitoring nutrition status and progress in food fortification implementation regularly gives feedback to decision makers.

Nutrition and health are relatively low priorities in the national budgets of developing countries. The health authorities often failed to provide top decision-making bodies with convincing data on the magnitude of micronutrient malnutrition and its economic and health costs, compared to the advantages and low cost of fortified food. Frequent changes of ministers and other decision makers also sometimes eroded the support built up by country project teams, and this could not be reestablished before the initiative ended.

Public–Private Partnership

Public–private partnership was essential in sustaining the initiative's momentum. Project steering committees, which later became national food fortification alliances, provided a framework for new, multisector collaboration encompassing the public, private, academic, donor, and NGOs devoted to food fortification. Alliance membership should be defined by shared objectives, an understanding of how mutual contributions benefit the whole alliance, mutual cooperation, and respect for other organizations in the alliance. In many cases, the challenge of alliance building lies in working with

the most senior officials in the allied groups. Only when they can be persuaded to act beyond their own organization's role and provide support for the alliance and its other members can they achieve major goals, such as prevention and control of iodine deficiency and anemia. In the first JFPR project, all groups accepted that no agency or project could tackle these problems alone.

Incentives for Food Producers

The initiative found that, even with mandatory fortification legislation, incentives for private producers to start fortification were helpful and often necessary. Lack of incentives for food producers resulted in low production, because expenditures were not balanced with sales.

Incentives employed in the participating countries included tax exemptions; import licenses and loans for equipment and raw materials; initial subsidies to buy fortificants; assistance in developing quality control systems and training production, administrative, and marketing personnel; training the wholesale and retail sectors; and prohibiting imports.

The extent of incentives required for convincing private producers to fortify foods depends on their attitudes and expectation for government support. In the Kyrgyz Republic and Tajikistan, millers complained that food fortification interventions were not profitable. However, in Kazakhstan and Mongolia, the flour millers considered fortification as a tool for marketing and promoting quality products.

Demand Creation through Social Marketing

In future communication activities, demand creation can benefit from significant adjustments. For example, during the initiative, complementary communication activities by different groups were uncommon, and this substantially reduced their impact. Better-coordinated, mutually reinforcing messages sharing both a common theme and common styles across media would be more effective. Critical analysis of each country's communication work should precede design of new strategies.

At the consumer level, future communication activities need to improve and carefully monitor

and manage the links between supply of iodized salt and fortified wheat flour and activities related to generating demand. The more that can be done to involve millers and salt producers who are in leadership positions in alliances and communication activities, the better future projects are likely to fare.

Financial Sustainability

Cost sharing is an important first step toward sustainability. The main difference between the initiative and other donor support for food fortification was how the necessary inputs were financed.

Earlier, salt iodization was supported by other donors, who supplied free equipment and potassium iodate to salt producers. Consequently, salt producers and governments became dependent on donors, which appeared to be one of the reasons why USI did not happen after years of donor support.

The initiative made it clear that countries had to sustain fortification on their own by the end of the project. Thus, the initiative and producers shared the cost of fortificants from the beginning. Food producers did not mind sharing the cost as long as there was a level playing field, which could only be done through mandatory fortification.

Once legislation and regulatory frameworks for mandatory fortification and quality assurance and control (QAC) are in place, and demand for fortified foods has been created, the financial capacity of the particular food producer determines the sustainability of food fortification.

The initiative found that many producers, especially in the Kyrgyz Republic and Tajikistan, had little financial capacity to purchase fortificants in bulk. They could purchase only a small amount at a time, or pay for the fortificants only after selling the products. In Uzbekistan, producers had problems with foreign currency exchange and limited licensing for premix importation.

In such cases, food producers' associations play a crucial role in pooling members' resources and can carry out procurement for all members to achieve economies of scale. Tajikistan came up with a creative solution: its food producers' association created a revolving fund to purchase potassium iodate. The revolving fund is still operational.

Quality Control

Quality control in Central Asia needs further improvement at industrial sites and in monitoring food products at the retail level. Only Kazakhstan has an adequate system of industrial quality control for salt; the other countries need to improve the basic quality control procedures. The quality of iodized salt in Mongolia and Uzbekistan, for example, needed special attention in view of impurities and dampness of the raw salt. In flour milling, Kazakhstan and Mongolia have developed appropriate quality control systems (mostly at large flour mills), while the other countries still need to strengthen the internal laboratories of the mills.

As for external control, the initiative largely relied on the official sanitary epidemiological services (SEs) for inspection. Some people felt that their punitive approach was not always helpful and suggested that the initiative should have reformed SEs or established a different system, especially when rent-seeking behavior by SEs was suspected. Although institutional reforms of SEs would have been helpful, focusing on reform would have diverted project time and resources with little effect. Even if weaknesses of SEs had been better known to those who designed the project, they still would have decided to work with the existing quality assurance system rather than create a new one.

Need for Information on Food Producers

Limited information hampered the initiative from the outset. In all aspects, there was little available data compared with the situation in other parts of Asia. Almost no lessons from previous experience could be found to draw on. Lack of information especially affected flour fortification. Absence of information on the production and financial capacity of flour producers caused problems and delays in choosing mills to participate in the initiative, and absence of information on kinds of flour—the premium, first, or second grade consumed by different populations—led to focus on first-grade flour fortification, while rural populations largely consumed second-grade flour. The projects were frequently adjusted as new information became available, and they overcame most of the problems. The initiative filled critical information gaps in food fortification knowledge in the participating countries that will be vital for future fortification activities in the region. Still, any

new attempt to fortify food should be preceded by situation analysis of the particular food industry in addition to studying the feasibility of fortification itself.

Technology Transfer

Technology transfer accelerates establishment of food fortification better than substituting local capacity with foreign capacity. The initiative decided not to engage international consultants extensively, but to engage them selectively to build local capacity. Technical assistance was also included in the procurement contract. This domestic capacity development helped the countries to carry out food fortification without external help. Also, food producers, especially millers in Central Asia and Mongolia, are capable and find innovative solutions to various problems during flour fortification. Technical lessons learned during the initiative have been incorporated into training manuals, such as the Flour Fortification Initiative's Millers' Toolkit. A Mongolian-language training manual was also written. Some of the material has been translated into Russian—there were few Russian technical materials available at the start of the initiative, which was a complaint voiced by some millers.

Risks of External Shocks

The risk of external shocks needs to be factored into any food fortification project. For example, wheat flour production varies depending on weather, so price and availability fluctuate greatly. This negatively affected flour fortification during project implementation. Smaller countries that depend on imports for their wheat did not have enough wheat flour in 2003 to fortify, prices rose, and both governments and industries temporarily stopped promoting flour fortification because of its (albeit marginal) additional cost.

Conclusion

As the UNICEF representative said at the initiative's final conference, the initiative has put "micronutrient deficiencies" on nonnutritionists' agendas and brought investment by other international organizations in Central Asia. This hastened the transfer of appropriate fortification technologies

to the food industry, helped governments put regulatory frameworks in place, built awareness of the benefits of fortified salt and flour among the region's population, and developed the ability of NGOs and consumer groups to monitor the quality of foods. The initiative has also generated other external assistance to develop capacity in nutrition and food fortification in the region.

All these achievements crystallized together and demonstrated that iodine deficiency disorders (IDD) have been reduced, and the potential exists for major reduction of iron deficiency anemia (IDA) through flour fortification. As discussed earlier, decreased incidence of IDD and IDA will lead to fewer maternal and infant deaths and mental retardation cases, and lead to economic gains in national economies.

The initiative demonstrated a relatively inexpensive and sustainable approach to attaining some of the Millennium Development Goals (particularly those in health and education) by working toward nationwide protection against micronutrient deficiencies that would otherwise cause major public health problems and reduced outcomes of education.

However, mass fortification of food staples is not a panacea; it takes years and great effort to get started, accepted, and established to the point of being self-sustaining. Fortification of staple foods also does not directly benefit, nor is it aimed at, children under 2 years of age.

Mass fortification cannot meet the needs of population segments with special nutritional needs, such as young infants, pregnant and lactating women, the sick and infirm, or the elderly. Central Asia contains remote regions without ready access to commercially milled flour, particularly in winter when road travel is impossible. For these cases, alternative or additional interventions will remain preferable, including supplements and complementary weaning foods for infants and children under 2 years of age.

Regardless of the initial success of fortification efforts, the underlying deficiency in the soil (salt) and processed product (wheat flour) remain constant

threats to nutrition. The disorders and diseases that compel fortification can return under a variety of circumstances. Fortification must be continued into perpetuity, all other things being equal. This requires continued political will, institutionalization of the fortification paradigm, and adequate budget for its implementation. In turbulent social or economic times, none of these can be guaranteed.

Next Steps

Much remains to be done. The foremost needs are to consolidate and continue or accelerate the rate of progress already made toward individual and harmonized standards, legislation, and regulations, bearing in mind that there are limits to how much the different countries in a regional initiative will cooperate.²³

Nevertheless, the existence of a single mandatory standard means that trade issues—at least among the participating countries—will not remain a barrier to universal fortification in the region.

The third Almaty Forum, near the end of the initiative (October 2007), adopted recommendations for follow-up actions and helped design and adopt the national action plans for 2008–2010 by all participating countries. These countries committed to a number of individual actions—mainstreaming food fortification strategies into national development plans, strengthening national fortification alliances, completing necessary legislation and regulations, monitoring imports and quality and safety, removing barriers to procurement of fortificants and equipment, and setting aside a sufficient budget for these purposes.

At the regional level, the countries agreed to strengthen their collaboration on aspects of fortification and to harmonize standards, remove impediments to trade in fortified foods, and create further economies of scale for food fortification inputs. The Declaration of the Third Almaty Forum, which includes the recommendations, is shown in Appendix 6.

²³ For example, the countries have agreed on a single flour fortification premix and fortified standard but not on a set of mandatory regulations or food control measures. Each country in the initiative has written its own regulations with little attempt to harmonize them.

Near the end of the projects, there was a movement toward establishing a regional flour milling association that led to the formation of the Central Asian International Association of Operative Mills. This was a type of result the initiative wished for—a regional association independent of external assistance.

Since the projects finished at the end of 2007, Kazakhstan and the Kyrgyz Republic have adopted mandatory flour fortification laws. Uzbekistan is said to have drafted one also. Salt iodization has largely been maintained, at least at the level the countries achieved by the end of 2007. The Kyrgyz Republic has received donor assistance in purchasing premix, although it has a different composition from KAP 1. The impact of the Kyrgyz Republic using a different premix from the rest of the region is unknown.

The initiative has proven that a regional approach can be effective. Other donor agencies

continue to support food fortification in the region, but in each country, not on a regional scale.

Inclusive growth and regional integration are two of the three strategic agendas of ADB's long-term strategic framework for 2008–2020, Strategy 2020,²⁴ which emphasizes the private sector as a driving force for inclusive growth. Ten years have passed since the pivotal Manila Forum 2000, Strategies to Fortify Essential Foods in Asia and the Pacific. During the decade since 2000, Asia and the Asian Development Bank (ADB), together with other development agencies, have acquired experience in promoting food fortification. With the new focus of Strategy 2020, ADB should reinvigorate its efforts to promote food fortification through public–private partnership so as to deliver much-needed micronutrients to populations in need.

²⁴ ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank 2008–2020*. Manila.

APPENDIX 1

History of Food Fortification in Central Asia and Mongolia before the Initiative

Iodine

Union of Soviet Socialist Republics to 1991

In the former Union of Soviet Socialist Republics (USSR), the addition of potassium iodide to salt to address iodine deficiency was, for almost 40 years, governed by a 1954 ordinance from the Ministry of Health in Moscow that defined the regions in the USSR with a high prevalence of endemic goiter, to which iodized salt should be supplied. This ordinance formed the legal basis for the establishment of anti-goiter dispensaries unified under the central Anti-Goiter Commission in Moscow and anti-goiter committees in each of the listed regions under their respective republican ministries of health.

Large-scale enterprises for salt production were set up first in Russia and Ukraine and, from the mid-1950s, also in Kazakhstan and other republics. The Salt Industry Research and Development Institute in Ukraine devised machineries for salt harvesting, washing, and processing that were used throughout the republics. The potassium iodide used for iodization at that time was readily available from underground sources in Azerbaijan, Russia, Turkmenistan, and Ukraine. Data from a personal archive kept by the president of the Association of Russian Salt Producers indicate that the total supply of iodized salt in the USSR increased from about 100,000 tons to almost 1 million tons between 1950 and 1965.

The 1954 ordinance also mandated state-financed distribution of iodine tablets to pregnant and breast-feeding women, young children, and adolescents in high-risk areas. By 1965, a USSR-wide survey found the total goiter prevalence to be 6.2%, indicating a successful campaign. Prevalence fell further by 1969, to 5.0%, attributed to tightening of measures aimed at control and prevention.

By the early 1970s, goiter had been virtually eliminated and new cases of endemic cretinism were no longer observed. The Ministry of Health in Moscow officially declared that endemic goiter had been overcome and it abandoned central oversight and monitoring.

By the mid-1980s, however, sanitary epidemiological services (SESs) in the republics increasingly reported findings of low-quality iodized salt resulting from aging equipment and the instability of potassium iodide fortificant. In 1986, significant proportions of samples from the Soviet republics were reported to contain no iodine. Around the same time, iodized salt production started to decrease, along with the overall decline in the centralized Soviet economy. In 1990, the production of iodized salt was only about half the planned amount of 1.4 million tons.

The USSR Ministry of Health during 1986–1989 widened the orientation of dispensaries from the treatment and control of endemic goiter to diagnosis and treatment of endocrine conditions, primarily diabetes, although no extra resources were provided to meet these goals. A 1990 survey in 11 of the 15 republics recorded 1,044,767 people with goiter—a marked rise over the 1969 figure. In some Soviet republics, the recorded number of patients had increased by 24%–177% between 1969 and 1988–1990. By 1990, it was obvious that iodine deficiency disorders (IDD) had reemerged as a significant public health threat in the Soviet Union.

Central Asia from 1991

In Central Asia, salt supplies were falling in response to the economic difficulties associated with transition from a centralized economy, the privatization of salt and other food enterprises, and the absence of regulatory acts and economic incentives for

production. In Kazakhstan, in 1993, less than 25% of the local salt production was reported as iodized. Goiter prevalence among schoolchildren in Kentau town in South Kazakhstan oblast (district) reached 26% (1,025 people examined) by 1997, while among adults a goiter rate as high as 50%–60% was cited. According to reports from obstetric facilities in Almaty, hypothyroidism was diagnosed in 7.2% of newborns in 1996, which was 150–300 times higher than records of iodine-sufficient countries.

The need for a national policy on nutrition, including elimination of IDD, was raised in Kazakhstan for the first time in 1996 at an international conference held in Almaty with the support of the United Nations Development Programme (UNDP), United Nations Children's Fund (UNICEF), and the United States Agency for International Development (USAID). Follow-up action to start (re)building national capacity to address iodine deficiency through salt iodization took place with assistance of the Central Asia Area UNICEF Office in 1997.

In the Kyrgyz Republic, surveys in 1991 showed goiter prevalence of 25%–28% among adults in Bishkek, Chui, and Issyk-Kul oblasts; and thyroid diseases reported by the health facilities were rapidly increasing from 1992 onward, most likely due to increased goiter diagnoses. In September 1994, the prime minister signed a decree on the elimination of IDD in the population of the Kyrgyz Republic, stipulating that all food-grade salt for human and animal consumption should be iodized according to the interstate industry standard (gosudarstvennyy standart, or GOST) that had previously been in force in the USSR. However, the government intent to develop a national program, including legislation and enforcement of salt iodization, came to fruition only after the 1990s.

Historically, Tajikistan was known for the severe IDD prevalence in its population. Up into the 1970s, the IDD extent was reported to have been reduced to mild. An assessment in April 1994, however, showed that goiter in school-aged children was as high as 42% in Dushanbe and 86% in Tursun-Zade, an area selected by local endocrinologists for its historically high IDD burden. In May 1997, the government issued an approval ordinance of a national program for IDD control giving priority to salt iodization, along with detection, registration, and treatment

of goiter cases. UNICEF provided equipment and fortificant for some years.

Until 1991, all the salt for human consumption in Uzbekistan was imported from Ukraine and Kazakhstan, reportedly duly iodized according to regulations. Following independence, the Uzbekistan government fostered local salt production, and by 1993, it was reported that about one-third of the edible salt consumed in the country was produced locally but not iodized. Between 1997 and 1999, UNICEF donated spray iodization units and fortificant to various producers in an effort to increase iodized salt supplies. UNICEF also offered support for the development of a national IDD control program. However, despite goiter prevalence in 1997–1998 of more than 40%, the government was not then interested. A multiple indicator cluster survey (MICS) in 2000, the first nationally representative survey of iodized salt use in Uzbekistan, showed that only 19% of households were using adequately iodized salt.

In Central Asia by the end of 1999, UNICEF had donated a sizable amount of iodization equipment and potassium iodate, sufficient in theory to enable iodization of a major part of the national edible salt supplies. The disappointingly low outcomes observed in the use of iodized salt in households indicated that more was needed than just provision of technology and fortificant inputs.

The oversight and direction characteristic of the centrally planned goiter-control efforts during the 1950s and 1960s had completely disappeared. As well, although the inputs were necessary, they were not sufficient to persuade the salt producers to supply good-quality iodized salt. The salt producers did not see the resolution of a health issue as a core value. The purchase orders from their customers did not specify that the salt should be iodized, obligatory certification by the state of standards had not yet been firmly introduced, and the threat of penalties associated with food inspections was low. Thus, universal salt iodization (USI) could not be reached, and IDD could not be overcome through stimulation of only a single sector.

Mongolia from 1990

The population of Mongolia in the 1950s was mostly nomadic, although urbanization had started to increase. Mongolia's landscape offers many natural

salt deposits that have been used for centuries for human and animal consumption, as well as other common uses, such as preparing leather and preserving meat.

Discussions of IDD and their elimination started during the early 1990s in response to the World Summit for Children. In 1993, the overall prevalence of goiter among children was 29.2%. The minister of health proposed that all salt intended for humans and animals should be iodized, a measure resisted by some influential scientists who were not convinced that the survey results signified iodine deficiency. However, a national plan of action was developed and officially inaugurated by the president in 1996. UNICEF and the Government of Japan provided supplies and equipment for implementing the plan. But the legislation and/or regulation necessary for safeguarding the agreed USI strategy did not follow. Thus, notwithstanding the huge assistance that followed the launch of a national program in 1996, only little more than half the households in Mongolia were using adequately iodized salt by the turn of the century.

Iodine Status, End 1990s

The collective experience in Central Asia and Mongolia showed that a different approach was needed to advance iodization in the region. The method should combine the abilities of the public, private, and civic sectors and be based on mutually supportive actions by concerned people who could marshal and prioritize the requisite knowledge, talents, and resources. The contributions by each sector and specialty should be guided and overseen by a national partnership involving all the key sectors.

In May 2001, the presidents of Azerbaijan, Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan were among the heads of state who supported acceptance of an agreement to prevent iodine deficiency among the Commonwealth of Independent States, signed in Minsk, Belarus. The agreement stressed coordination and harmonization of efforts and offered an important starting point for Central Asian countries to agree to a common framework for the legislation and execution of salt iodization policies.

Globally, more than 70% of households were using iodized salt by the end of 1999, compared with less than 20% in 1990. USI progress was seen to vary from close to 90% in Latin America to 22% in Eastern Europe, the Commonwealth of Independent States, and the Baltic States. Regional progress, therefore, did not differ significantly from that in the countries of concern here.

Table A1.1, based on a World Health Organization (WHO) report,²⁵ summarizes program status in the countries, supplemented with data from the various information sources used in the present historical perspective. These data serve as a summary benchmark for the countries at the beginning of the initiative.

Iron

Wheat is the obvious vehicle for iron fortification in Central Asia. It originated as a cultivated crop around 6,000–8,000 years ago in the region of Asia that now runs from Iraq to Turkmenistan. Wheat cultivation and the popularity of bread spread throughout the Middle East into Egypt, Europe, Central Asia, and northern parts of what is now the People's Republic of China. Wheat is still a vital food staple in these areas. Per capita wheat flour consumption in Central Asian countries (Table A1.2) is among the highest in the world. Wheat supplies more calories and more protein to the population than any other crop.

USSR to 1991

The USSR ran a limited wheat flour fortification program from roughly the 1970s into the 1980s but it did not include iron. The program involved adding thiamin, riboflavin, and niacin at very large flour mills in the Soviet Union with milling capacities of over 500 tons annually. This included some mills in the Central Asian republics. The vitamins were supplied by Moscow to the mills. The mills stopped fortifying as vitamin supplies dwindled and the equipment fell into disrepair. By 1990, flour fortification in the Soviet Union had ceased.

²⁵ B. de Benoist, et al., eds. 2004. *Iodine Status Worldwide. WHO Global Database on Iodine Deficiency*. Geneva: WHO.

Table A1.1: Summary of National Iodine and Iodine Deficiency Disorders Elimination Policy and Program Status, 2000

Indicator	Kazakhstan	Kyrgyz Republic	Mongolia	Tajikistan	Uzbekistan
Population (millions)	14.9	4.9	2.5	6.4	24.8
Gross Domestic Product (\$/capita)	5,000	2,700	1,780	1,140	2,400
Iodine Deficiency Extent. Most recent survey, goiter prevalence, urinary iodine, TSH, cretinism	Moderate to severe ID, survey in 1999 showed median UIE 95 µg/l among women of child-bearing age. Cretinism known historically.	Moderate to severe ID, small studies of school-aged children 1994 showed 39% goiter, median UIE 30 µg/l. TSH elevated in 60% of newborns in major maternity clinics.	Mild to moderate ID, national survey of school-aged children 1993: 29% goiter. All but 2 <i>aimags</i> (provinces) affected, ID most severe in central and west Mongolia and Ulaanbaatar.	Moderate to severe ID. Cretinism in GBAO known historically. Small studies of school-aged children 1994: goiter 42%–86% in Dushanbe and Tursun-Zade.	Moderate to severe ID, nonrepresentative large-scale surveys in 1997 show goiter increase in school-aged children to >40%.
Salt Industry. Number of salt producers, amount of edible salt produced, imported and exported, packaging	Salt locally produced, mainly by AralTuz (80% of national supply) and PavlodarSol. Imports in west and northeast Kazakhstan from the former Soviet Union.	More than 75% salt imported from Kazakhstan (AralTuz and Zhambyl). 3 local processors, poor packaging, no labeling.	Majority of salt imported from Russia or the People's Republic of China. Local consumption from many natural deposits. Simple methods, poor-quality salt.	Three major producers in Tajikistan. Exports to Kyrgyz Republic, Afghanistan, and Uzbekistan. Poor-quality salt, poor packaging.	Major salt deposits developed to production under government administration, packagers in Tashkent. Poor packaging, no labeling.
Salt Iodization. % adequately iodized household salt, level mandated, iodine compound, cost of iodized salt	Iodization with iodate has been introduced at both AralTuz and Pavlodar. Industry quality and food control practices not yet settled. Health survey in 1999 showed 29% households using adequately iodized salt.	Interstate USSR standard iodate has been introduced. Local processors are equipped. QA, food control, and enforcement practices are weak. Health survey 1997 showed 27% households using adequately iodized salt.	Voluntary iodization level introduced. Border control not functional. Use of salt from natural deposits highest in west Mongolia. Survey in 1998 showed 78% households using adequately iodized salt. Iodized salt about twice as expensive as noniodized salt.	Interstate USSR standard iodate has been introduced. Industry quality and food control practices not yet settled. Iodized salt supplies reportedly up to 80% of total production. MICS 2000 showed 20% households using adequately iodized salt.	No mandatory level stated by government. Local producers and processors equipped but industry quality and food control practices are unclear. Iodate has been introduced. MICS 2000 showed 19% households using adequately iodized salt.

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Table A1.1 *continued*

Indicator	Kazakhstan	Kyrgyz Republic	Mongolia	Tajikistan	Uzbekistan
Legislation and Regulation. Principle act, subsidiary norms and regulations	Legislation pending. In practice, interstate USSR standards still being followed.	1994 decree mandates iodization of all edible salt. Parliamentary law being prepared.	Legislation pending.	Legislation pending.	Government commitment weak. No effort to prepare for legislation yet.
National Coalition. Establishment, composition, meeting frequency	No effort yet made to promote a coalition.	No effort yet made to promote a coalition.	National Council for IDD Control, multisector, chaired by deputy minister of health.	No effort yet made to promote a coalition.	No government experience of partnership building. No effort yet made to promote a coalition.
National Program. Acceptance, major components, financing, budget support	National program being prepared, main strategy USI but also supplements being considered.	National program not yet being considered.	National program launched in 1996, main strategy USI. Local budget with UNICEF and JICA support.	National program not yet being considered.	National program not yet being considered.
Progress Monitoring. Arrangement, laboratory capacity, reporting	Dependence on large national surveys. Kazakh Academy of Nutrition well qualified.	No national surveys, but donor-driven small-scale studies in project areas.	National survey completed in 1999. Results pending.	Dependence on large national surveys. Endocrinology Dispensary is qualified.	Institute of Endocrinology plays central role but relies on small-scale studies.
Human Resources. Institutions, training needs, international links	Government officials and industry staff generally well qualified	Need for training in industry QA, lab capacity weak. Food inspection training needed.	Strong role by Public Health Institute. Links with Japanese and Chinese scientists.	Government officials and industry staff weak and need training.	Government officials and industry staff weak and need training.
Donor Involvement	UNICEF	UNICEF	UNICEF, JICA	UNICEF, Aga Khan	UNICEF

GBAO = Gorno-Badakhshan Autonomous Province, ID = iodine deficiency, IDD = iodine deficiency disorders, JICA = Japan International Cooperation Agency, MICS = multiple indicator cluster survey, QA = quality assurance, TSH = thyroid stimulating hormone, UIE = urinary iodine excretion, UNICEF = United Nations Children's Fund, USI = universal salt iodization, USSR = former Union of Soviet Socialist Republics, µg/l = micrograms per liter.

Source: ADB. 2009. *Promoting Universal Salt Iodization in Central Asia and Mongolia, 2001–2007. Experiences of Japan Fund for Poverty Reduction (JFPR) JFPR9005 and JFPR9052*. Consultant's report. Manila.

Central Asia from 1991

Prior to its fortification efforts, UNICEF began an anemia prevention and control (APC) program in 1997 in Central Asian countries. The program was

based on education and provision of supplements of iron tablets alone, or iron tablets with folate tablets. At the same time, advocacy efforts were directed to increase acceptance of flour fortification.

Table A1.2: Wheat Production and Flour Consumption in Central Asia and Mongolia

Country	2006 Population (millions)	Wheat Production (‘000 tons/year)	Wheat Consumed Supplied by Local Wheat Production (%)	Flour Consumption ^b	
				(grams/ person/ day)	(‘000 tons/year)
Azerbaijan	8.5	1,537	89	428	1,299
Kazakhstan	14.8	10,703	494	294	1,623
Kyrgyz Republic	5.3	987	94 ^a	417	785
Mongolia	2.7	123	47	212	198
Tajikistan	6.6	640	72	302	626
Uzbekistan	27.0	4,186	144	304	2,912
Total	64.9	18,175	...	...	7,442

Note: Wheat production figures are average Food and Agriculture Organization (FAO) values for 2003–2005.

^a This figure for the Kyrgyz Republic was reported to be 64% in 2008.

^b Flour consumption includes imports and is estimated from FAO wheat consumption values for 2003–2005 using a flour extraction rate of 75%.

Source: ADB. 2009. *Promoting Wheat Flour Fortification in Central Asia and Mongolia, 2001–2007. Experiences of Japan Fund for Poverty Reduction (JFPR) JFPR9005 and JFPR9052*. Consultant’s report. Manila.

UNICEF initiated two flour fortification projects in Central Asia—one in the Kyrgyz Republic in 1995 and one in Turkmenistan in 2000. Both involved fortifying flour with iron from ferrous sulfate. The Kyrgyz Republic project also included adding a small amount of iodine to flour as potassium iodate, which was used as a bread improver in the United States but also functions as a nutritional source of iodine. UNICEF supplied the ferrous sulfate and the microfeeders for adding it at the flour mills.

This project faltered in the Kyrgyz Republic when some of the fortified flour was found to turn rancid and change color. This is a well-known problem with the use of ferrous sulfate, occurring when an excessively high level is added or the flour is stored for too long. Ferrous sulfate is considered a good source of nutritional iron because it is well absorbed by the body. It is also relatively inexpensive. Ferrous sulfate has been used to fortify bakery flour in the United States for decades, but such flour is normally used up within weeks of being milled.

Wheat flour contains a small amount of fat that can oxidize and turn rancid over time, giving it a limited shelf life. This problem is more pronounced with high storage temperatures and in higher-extraction (high ash) flours because they have a

higher fat content. Ferrous sulfate is a pro-oxidant that accelerates the rate at which oxidative rancidity develops in flour. The more ferrous sulfate added, the higher the flour’s fat content, and the longer the flour is stored all work to reduce a flour’s shelf life by producing unacceptable odor and color.

It is probable that in the Kyrgyz Republic some of the first-grade flour (which has a higher fat content than the lower-ash, premium-grade flour) was fortified with a much higher-than-desired level of ferrous sulfate, and this led to the reported quality problems. The experience gave ferrous sulfate, and to some extent flour fortification in general, a bad reputation in the country, so the project was terminated.

Turkmenistan appears to have avoided similar problems, because the level of ferrous sulfate being added there is very low—only 25 grams per ton of flour or 8 parts per million (ppm) of added iron. The normal addition would be 94 grams of ferrous sulfate per ton, or 30 ppm of added iron. Any problems due to accidental overtreatment have not been serious or extensive enough to cause changes in the program. Another difference could be that the government-controlled milling industry does not depend on customer satisfaction as the private milling industry in the Kyrgyz Republic does.

Turkmenistan continues to fortify flour with ferrous sulfate to this day, and increased the level to 25 ppm of iron in 2006.

Iron Status, End 1990s

UNICEF's APC program continued to rely on education and supplement distribution. Educational efforts included promotion and instructions to pregnant women and small children on the regular use of iron tablets, or iron tablets with folate tablets, combined with recommending foods that are good sources of iron and encouraging tea drinking no closer than 30 minutes before or after eating. The APC program found that, while the supply and distribution of iron supplements was generally adequate, it fell short of preventing iron

deficiency anemia (IDA) because of a continued focus on anemia treatment alone. Also, getting young children and nonpregnant women to take supplements regularly was difficult and depended on how well the local health workers encouraged it. This was especially a problem with folic acid, which is needed prior to pregnancy if birth defects are to be prevented.

Many of these supplementation and educational activities are ongoing in the region, and they should always be part of any nutritional intervention program. But it is well recognized that human habits change slowly, so education alone has limited effectiveness, while distributing free supplements requires continuous funding by donor agencies or the government.

APPENDIX 2

Almaty Declaration, 2001

Improving Nutrition of Poor Women and Children in Central Asia and Neighboring Countries

After four days of deliberation, participants from six neighboring central Asia nations, attending a regional roundtable on salt and wheat flour fortification from 8-12 October sponsored by the Asian Development Bank, the United Nations Children's Fund and the Kazakh Academy of Nutrition and funded by the Government of Japan through the Japan Fund for Poverty Reduction, agreed on the following set of principles, strategies and actions (to be supported by the Japan Fund through 2002):

- We recognize:

In recent years the nutrition status of women and children in our region has deteriorated badly with negative consequences for children, families and nations - iodine and iron deficiencies are the most serious, but other essential nutrients need to be addressed;

that the damage to the learning capacity of our children from iodine deficiency in pregnancy is irreversible;

that iron deficiency is causing serious damage to social and economic development through poorer pregnancy outcomes, impaired cognition especially in young children, reduced work capacity and increased morbidity from infectious diseases;

that zinc deficiency is associated with lowered immunity, slower growth and increased risk of heavy metal poisoning in contaminated environments;

that folic acid deficiency in women who become pregnant contributes to congenital abnormalities of the central

nervous system of the newborn and is an independent risk factor for coronary heart disease; and

that the key B-vitamins thiamin, riboflavin and niacin are removed during milling along with most iron and folic acid contributing to micronutrient malnutrition among populations whose diets are heavily dependent on bread and other flour-based foods.

- We affirm:

that the addition of potassium iodate to all salt sold for human nutrition is a well established method for eliminating iodine deficiency as a societal problem;

that the KAP Komplex formula, developed by the Kazakh Academy of Nutrition for Central Asia, is an appropriate and safe basis for wheat flour fortification in the populations of the region to prevent deficiencies of thiamin, riboflavin, niacin and folic acid and reduce iron and zinc deficiency. This formula is freely available to any enrichment mix producer;

that people of the region should have access to affordable, safe, and efficacious fortified foods as a permanent commitment to the elimination of micronutrient malnutrition;

that there are no capacity constraints for private producers to achieve significant progress in providing affordable fortified salt and flour to consumers in the region;

that the consequences of not implementing fortification programs at national level will be poor child development, low educational achievement of children, and decreased earnings and economic growth; and

that the initiative, supported by the Japan Fund, will contribute to fulfilling commitments made by the participating governments to universal protection of children.

- Therefore, we pledge:
 - that all salt for human consumption will be fortified with potassium iodate and to the maximum extent achievable wheat flour will be fortified with micronutrients using the KAP Komplex formula.
- This will require:
 - that food laws and regulations be reviewed and amended to ensure they support and enable the addition of all essential micronutrients in appropriate food carriers;
 - that public policies and regulations that constrain or impede investment in food fortification to reduce micronutrient malnutrition be reviewed and amended and that all nations collaborate to produce uniform or consistent standards based on international best practices that will smooth the trading of foods;
 - that customs protocols and trade regulations will be revised or enacted to ensure the import and export of certified and safe fortified foods at agreed levels of fortificants;
 - that the cost of food fortification must ultimately be borne by the producer and the consumer, but a transition period of cost-sharing between the public and private sectors may be necessary;
 - that efforts be continued to inform the public of the benefits of fortified salt and flour to the learning and earning capacities of the region's children and that the interests of NGOs, especially women's federations and consumers' rights unions, be fully included in future activities jointly conducted by the nations; and
 - that food fortification must be a part of a comprehensive strategy of anemia prevention and control that includes

supplementation, dietary diversification, breastfeeding promotion and other public health measures.

National Actions

National actions to achieve this will require the following coordinated actions at national, oblast and local levels:

Pass and effectively implement mandatory salt iodization laws in all countries and move forward the consideration of flour fortification laws in a timely fashion.

Urge the elimination of tariffs and value-added taxes on inputs to fortification and fortified food products, imported or domestically processed, to promote sustainability.

Avoid excessive price increases for fortified products that may discourage consumer preference.

Initiate cost-sharing by public and private sectors of the costs of producing fortified salt and flour and strengthen the capacity of the private sector to be fully self-reliant shortly after the Japan Fund project completion.

Establish a monitoring framework to assess progress in the percent of salt and wheat flour fortified during production and families with access to fortified food products.

Integrate fortification programs into national strategies and policies to reduce poverty, raise the quality of human resources and support the survival, growth, psychosocial and cognitive development of all children, especially those of early ages.

Promote an expanded public sector-private sector dialogue on fortification of salt and cereal flour and organize advocacy events to increase program and donor support.

Develop and implement a communication strategy and campaign to raise public

awareness and improve the child caring skills of parents on the importance of fortified salt, wheat flour and wheat flour products and promote increased consumer demand for these products. These activities will be led by non-governmental organizations in collaboration with the private sector, national experts, the media, local authorities and communities.

Promote mechanisms to exchange information and experiences within and across the countries of the project using the world wide web and other modern communication tools.

Obtain, update and disseminate information on the prevalence of micronutrient deficiencies by including micronutrient-related data collection into Demographic and Health Surveys, Multiple Indicator Cluster Surveys and other nutrition, health and education surveys.

Regional Actions

Develop a framework for drafting and proposing harmonized regional and international trade standards and guidelines for fortified foods.

Develop regional activities such as roundtables, joint reports and cross country training focusing on legislation, communication strategies and partnerships among the civil society and private and public sectors.

Demonstrate through regional policy dialogue to economic planning agencies and the general public the large economic damage caused by poor nutrition and the proven low-cost solutions available to the region.

Advocate resource mobilization by governments from domestic budgets, public and private, and strategic investments from development partners, and share country experience in regional forums.

Review and recommend financial and capacity building incentives to sustain food fortification and its expansion to other essential foods widely consumed by the poor.

Set up sentinel sites in at least three project countries to monitor progress of continuing efforts to fortify all salt and wheat flour.

Create communication mechanisms, including a web site, that allow project countries to share advocacy, technical and promotional activities among themselves and with the global community.

Include micronutrient malnutrition issues into the agenda of regional expert group consultations such as associations of pediatricians, nutritionists and reproductive health specialists.

Prepare progress reports toward elimination of micronutrient malnutrition to the Regional Health Ministers Council.

APPENDIX 3

Regional Workshops under the Initiative

Project Management Training and Communication Strategy for Food Fortification; held in Bishkek, Kyrgyz Republic; 4–7 March 2002.

Quality Assurance and Control, Regulations, and Standards; held in Tashkent, Uzbekistan; 19–21 June 2002.

Wheat Flour Fortification and Midterm Review; held in Astana, Kazakhstan; 1–3 October 2002.

Policies on Food Fortification, Monitoring, and Evaluation; held in Bishkek, Kyrgyz Republic; 7–9 April 2003.

Regional Information Meeting on Communication Strategy and Project Management; held in Bishkek, Kyrgyz Republic; 22–24 August 2005.

Second Conference of Salt Producers on Sustainable Quality Iodization in Central Asia and Mongolia; held in Tashkent, Uzbekistan; 22–24 November 2005.

Regional Conference on Quality Wheat Flour Fortification in Central Asia and Mongolia; held in Almaty, Kazakhstan; 7–9 February 2006.

Regional Midterm Review Workshop; held in Cholpon-Ata, Kyrgyz Republic; 11–14 September 2006.

APPENDIX 4

Performance Indicators of the Japan Fund for Poverty Reduction Projects

First Japan Fund for Poverty Reduction Project

There were only two performance indicators in the first Japan Fund for Poverty Reduction (JFPR) project document. At an early stage of the project, targets of 66% of salt to be iodized, and 33% of flour to be fortified, were set, although without a sound analysis, and the target set for flour fortification was unrealistic. The final set of indicators was as follows:

- Reduction of iron deficiency anemia (IDA) and iodine deficiency disorders (IDD) prevalence.
- 66% consumption of iodized salt by the end of project.
- 33% consumption of fortified flour by the end of project.
- Regulations on assuring quality of fortified foods.
- Passage of universal salt iodization legislation before 31 December 2002.

- Formal consideration of universal flour fortification in parliamentary committee or the equivalent before the end of the project.

Second Japan Fund for Poverty Reduction Project

- Increased use of iodized salt to 90% of households.
- Permanent sustainable system to procure annual requirements of potassium iodate established in each country.
- Increased fortified commercial wheat flour production to country-specific targets.
- National premix procurement and/or production systems established.
- Regulations and/or legislation to promote universal flour fortification in each country.
- Establishment of trade regulations supporting regional trade of fortified flour and iodized salt.

APPENDIX 5

Legislation and Regulations on Food Fortification in Central Asian Countries

Legislation and Regulations on Salt Iodization

Main Acts

- | | | | |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2000 | <ul style="list-style-type: none">• The Law of the Kyrgyz Republic on Prevention of the Iodine Deficiency Disorders (18 January 2000, ref. no. 40) | 2003 | <ul style="list-style-type: none">• The Decree of the Government of the Kyrgyz Republic About the National Program on Decrease of the Iodine Deficiency Disorders in the Kyrgyz Republic within the Period of 2003–2007 (9 December 2002, ref. no. 836) |
| 2001 | <ul style="list-style-type: none">• The Agreement on Iodine Deficiency Status Prevention Among the Population of the CIS States Members (Minsk, 31 May 2001)• The Decree of the Government of the Republic of Kazakhstan on Prevention of the Iodine Deficiency Disorders Among the Population of the Republic of Kazakhstan in 2002–2005 (5 October 2001, ref. no. 1283) | 2005 | <ul style="list-style-type: none">• The Law of Mongolia on Salt Iodization and Iodine Deficiency Disorders Prevention (10 October 2003)• The Law of the Republic of Kazakhstan on Iodine Deficiency Disorders Prevention (14 October 2003, ref. no. 489–II)• The Decree of the Government of the Kyrgyz Republic About the Concept of the National Policy on Healthy Nutrition (19 December 2003, ref. no. 785) |
| 2002 | <ul style="list-style-type: none">• The Decree of the Government of Mongolia About the National Program on Prevention of the Iodine Deficiency Disorders (1 May 2002)• The Decree of the President of Mongolia on Establishment of the Working Group on Design of the Law on Salt Iodization and Iodine Deficiency Prevention (20 November 2002)• The Decree of the Government of the Republic of Tajikistan on Adoption of the Strategy of the Health Care of the Population within the Period up to the Year 2010 (5 November 2002, ref. no. 436, section I, p.20)• The Law of the Republic of Tajikistan on Salt Iodization (2 December 2002, ref. no. 85) | 2007 | <ul style="list-style-type: none">• The Decree of the Government of the Republic of Uzbekistan About the National Program on Prevention of the Iodine Deficiency Disorders among the Population of Uzbekistan (26 September 2005, ref. no. 07-1-198)• The Law of the Republic of Uzbekistan On Iodine Deficiency Disorders Prevention (3 May 2007, ref. no. ZRU-97)• The Decree of the Government of Mongolia About the National Program on the Prevention of the Iodine Deficiency Disorders 4 April 2007, ref. no. 85) |

Facilitation of the Production and Trade of the Iodized Salt

- 2002 • The Decree of the Government of the Kyrgyz Republic on Procurement of Food and Agricultural Products for the Needs of the Ministries, Governmental Agencies, Public Institutions and Other Organizations to be Funded from the National Budget (Nutrition Account) (18 July 2002, ref. no. 478)
- 2004 • Monitoring Procedures on the Quality, Production, Storage, Import, Export and Sale of the Iodized Salt and Other Iodized Food Products (the Decree of the Ministry of Health of Kazakhstan, 18 August 2004, ref. no. 641)
- 2005 • The Decree of the Government of the Republic of Kazakhstan on Adoption of the Classification of Commodities and Services (share in percentage) to be Procured by the Public Funds from the Small-Scale Business Companies in 2005 (11 August 2005, ref. no. 828)
 - The Order of the Board of the Ministry of Health of Tajikistan on Mandatory Procurement of the Fortified Food Products for the Needs of the Hospitals (29 September 2005, ref. no. 9-2, section 6)
- 2006 • The Order of the Ministry of Education, Science and Youth Policy of the Kyrgyz Republic on Mandatory Use of the Fortified Wheat Flour and Iodized Salt in Schools' Catering Services (25 January 2006, ref. no. 42/1, item 2.2)
- The Law of the Kyrgyz Republic on Amendments to the Tax Code of the Kyrgyz Republic (20 January 2003): elimination of the vitamin and mineral additives from VAT
- 2004 • Customs Code of the Kyrgyz Republic (13 April 2004): elimination of the customs taxes on the imported equipment and spare parts (which cannot be produced domestically) and medicament substances (including vitamin and mineral additives)
- The Decree of the Government of the Kyrgyz Republic on The Basic List of the Production Equipment to be the Subject of VAT Elimination when Importing to the Kyrgyz Republic (27 May 2004, ref. no. 391): elimination of taxes for food fortification equipment (classification code TN VED 8437)
- 2006 • The Law of the Kyrgyz Republic on Amendments to the Tax Code of the Kyrgyz Republic (1 February 2006, article 148): elimination of the VAT on imported main production equipment
- The Law of the Kyrgyz Republic on Customs Code of the Kyrgyz Republic (29 March 2006): elimination of taxes on the equipment and spare parts which are not produced domestically; vitamin and mineral additives: group 30, code of goods 3003 90 900 9; "zero tax rate" on the import and export of the iodized salt: group 25, code of goods 2501 00 911 0

Tax and Tariffs Privileges

- 2003 • The Decree of the Government of the Republic of Kazakhstan on Rates of Customs Taxes on Imported Commodities (14 November 1996, ref. no. 1389, revised in 2004): inclusion of the potassium iodide/iodate in the list of the medical drugs and substances to be eliminated from taxes and VAT
- 2007 • The Decree of the President of the Republic of Uzbekistan on The Additional Activities to Motivate Modernization, Technical and Technology Re-equipment of industries (14 March 2007, ref. no. 3860): elimination of taxes for production equipment

Monitoring of Import, Export, and Sale

- 2002 • The Decree of the President of the Kyrgyz Republic on Strengthening of the State Monitoring and Control on the Production, Import, Storage and Sale of Salt in the Kyrgyz Republic (11 July 2002, ref. no. 184)
- The Decree of the Government of the Kyrgyz Republic on Implementation of the Decree of the President of the Kyrgyz Republic and On Strengthening of the State Monitoring and Control on the Production, Import, Storage and Sale of Salt in the Kyrgyz Republic (from 11 July 2002, ref. no. 184) (9 December 2002, ref. no. 836)
- 2005 • The Guidelines on Quality Control on the Fortified Food Products: the Joint Decree of the State Agency of the Professional Control of Mongolia, Ministry of Health of Mongolia and Ministry of Food and Agriculture of Mongolia (9 June 2005, ref. no. 84/143/87)

AO KHK -01-96 (27 September 1996, ref. no. 116/004492)

- Food common salt. Specifications: ST RK GOST R 51574-2003 (Committee on Standardization, Metrology and Certification under the Ministry of Industry and Trade, 31 October 2003, ref. no. 377)

Kyrgyz Republic

- Food common salt. Specifications: GOST R 51574-2000 (State Inspection on Standardization and Metrology, 10 September 2001, ref. no. 94-ST)

Mongolia

- Food natural common salt with content of iodine: MNS 5046:2001 (National Centre on Standardization and Metrology, 31 May 2001, ref. no. 33)

Tajikistan

- Food common salt: GOST 1060-04 (Agency on Standardization, Metrology, Certification and Trade Inspection, 5 March 2004, ref. no. 48-ST)
- Food common salt with content of iodine: GOST R 51575-2004 (Agency on Standardization, Metrology, Certification and Trade Inspection, 5 March 2004, ref. no. 48-ST)

Uzbekistan

- Food common salt with content of iodine. Specifications: O'z DSt 1091:2005 (Agency on Standardization, Metrology and Certification, 26 September 2005, ref. no. 05-30)

Quality Assurance and Control at Industrial Sites

Kazakhstan

- Food common salt. Testing methods: GOST 13685-84 (State Committee of the USSR on Standards, entered into force from 1 January 1985, amended 11.12.1985 and 06.04.1987)

Standards and Specifications on Salt Iodization

Potassium Iodate/Iodide

Kazakhstan, the Kyrgyz Republic, Tajikistan, Uzbekistan

- Reagents. Potassium iodide. Specifications: GOST 4232-74 (State Committee of the USSR on Standards, entered into force from 1 July 1975, amended 28.09.1984 and 11.12.1989)
- Reagents. Potassium iodate. Specifications: GOST 4202-75 (State Committee of the USSR on Standards, entered into force from 1 January 1977, amended 17.06.1991)

Production of Iodized Salt

Kazakhstan

- Food common salt with content of iodine. Specifications: TU 640 PK 197900772

- Food common salt with content of iodine. Methods of determination of iodine and sodium thiosulfate: **ST RK GOST R 51575-2003** (Committee on Standardization, Metrology and Certification under the Ministry of Industry and Trade, 31 October 2003, ref. no. 377)
- Regulations on monitoring procedures on quality, processing, storage, import, and sale of the iodized table salt and other food products with content of iodine (Order of the Ministry of the Republic of Kazakhstan, **18 August 2004**, ref. no. 641)

Kyrgyz Republic

- Food common salt. Testing methods: **GOST 13685-84** (State Committee of the USSR on Standards, entered into force from 1 January 1985, amended 11.12.1985 and 06.04.1987)
- Food common salt with content of iodine. Methods of determination of iodine and sodium thiosulfate: **ST RK GOST R 51575-2000** (State Inspection on Standardization and Metrology, 10 September 2001, ref. no. 94-ST)
- Food common salt with content of iodine. Requirements on processing, import, transportation, storage, and sale: Sanitary Regulations and Norms (**SP 2.3.4.006-04**, 12 November 2004, ref. no. 141-04)

Mongolia

- Methods of determination of iodine in iodized salt and drinking water: **MNS 4260:95** (National Centre on Standardization and Metrology, 15 November 1995, ref. no. 14)
- Food natural common salt with content of iodine: **MNS 5046:2001** (National Centre on Standardization and Metrology, 31 May 2001, ref. no. 33)
- Determination of iodine mass fraction in iodized salt: **MNS 5168:2002** (National Centre on Standardization and Metrology, 29 August 2002, ref. no. 30)

Tajikistan

- Food common salt with content of iodine: **GOST R 51575-2004** (Agency on Standardization, Metrology, Certification and Trade Inspection, 5 March 2004, ref. no. 48-ST)

Uzbekistan

- Food common salt. Testing methods: **GOST 13685-84** (State Committee of the USSR on Standards, entered into force from 1 January 1985, amended 11.12.1985 and 06.04.1987)
- Sanitary regulations and hygienic norms on processing and quality of the table salt (**SP 0085-98**, 5 November 1998; amendment 1, 20 December 2002)

Legislation and Regulations on Flour Fortification

Main Acts

- The Decree of the Government of the Kyrgyz Republic on Adoption of the List of the Flour Mills to be Engaged in the Wheat Flour Fortification, Use of Wheat Grain from the State Reserve Stocks and Mandatory Procurement of the Fortified Wheat Flour by the Public Institutions (**3 June 2002**, ref. no. 89-r, items 5-6)
- The Law of the Republic of Kazakhstan on Food Security and Safety (**8 April 2004**, ref. no. 543): Article 11 on mandatory wheat flour fortification
- The Decree of the Government of the Republic of Kazakhstan on the Regulations on Mandatory Fortification of the Premium and First Grade Wheat Flour produced in Kazakhstan (**7 July 2005**, ref. no. 708)
- The Decree of the President of Uzbekistan on Implementation of the National Wheat Flour Fortification Program (**11 August 2005**, ref. no. 153)

Facilitation of the Production and Trade of the Fortified Wheat Flour

- 2005 • The Decree of the Government of the Republic of Kazakhstan on Adoption of the Classification of Commodities and Services (share in percentage) to be Procured by the Public Funds from the Small-Scale Business Companies in 2005 (11 August 2005, ref. no. 828)
- The Order of the Board of the Ministry of Health of Tajikistan on Mandatory Procurement of the Fortified Food Products for the Needs of the Hospitals (29 September 2005, ref. no. 9-2, section 6)
- 2006 • The Order of the Ministry of Education, Science and Youth Policy of the Kyrgyz Republic on Mandatory Use of the Fortified Wheat Flour and Iodized Salt in Schools' Catering Services (25 January 2006, ref. no. 42/1, item 2.2)

Tax and Tariffs Privileges

- 2003 • The Law of the Kyrgyz Republic on Amendments to the Tax Code of the Kyrgyz Republic (20 January 2003): elimination of the vitamin and mineral additives from VAT
- 2004 • The Decree of the Government of the Republic of Kazakhstan on Rates of Customs Taxes on Imported Commodities (14 November 1996, ref. no. 1389, revised in 2004): inclusion of the potassium iodide/iodate in the list of the medical drugs and substances to be eliminated from taxes and VAT
- Customs Code of the Kyrgyz Republic (13 April 2004): elimination of the customs taxes on the imported equipment and spare parts (which cannot be produced domestically) and medicament substances (including vitamin and mineral additives)

- The Decree of the Government of the Kyrgyz Republic on The Basic List of the Production Equipment to be the Subject of VAT Elimination when Importing to the Kyrgyz Republic (27 May 2004, ref. no. 391): elimination of taxes for food fortification equipment (classification code TN VED 8437)
- 2006 • The Law of the Kyrgyz Republic on Amendments to the Tax Code of the Kyrgyz Republic (1 February 2006, article 148): elimination of the VAT on imported main production equipment
- The Law of the Kyrgyz Republic on Customs Code of the Kyrgyz Republic (29 March 2006): elimination of taxes on the equipment and spare parts which are not produced domestically; vitamin and mineral additives: group 30, code of goods 3003 90 900 9; zero tax rate on the import and export of the iodized salt: group 25, code of goods 2501 00 911 0
- The Law of Mongolia on Import Taxes and VAT: amendment on elimination of customs tax and VAT on imported wheat grain and wheat flour (29 June 2006)
- 2007 • The Decree of the President of the Republic of Uzbekistan on The Additional Activities to Motivate Modernization, Technical and Technology Reequipment of Industries (14 March 2007, ref. no. 3860): elimination of taxes for production equipment

Monitoring of Import, Export, and Sale

- 2005 • The Guidelines on Quality Control on the Fortified Food Products: the Joint Decree of the State Agency of the Professional Control of Mongolia, Ministry of Health of Mongolia, and Ministry of Food and Agriculture of Mongolia (9 June 2005, ref. no. 84/143/87)

- The Order of the Ministry of Health of Kazakhstan on Quality Control on Fortified Wheat Flour Production and Utilization of Premix (29 December 2005, ref. no. 07-21-15269)
- 2006 • The Guidelines on Quality Control on the Fortified Wheat Flour: the Joint Decree of the State Agency of the Professional Control of Mongolia, Ministry of Health of Mongolia, and Ministry of Food and Agriculture of Mongolia (1 December 2006, ref. no. 140/390/121)
- 2008 • The Guidelines on Enrichment (Fortification) of the Food Products in Regard to the Sanitary and Epidemiologic Surveillance: the Decree of the Government of Kazakhstan (19 January 2008, ref. no. 32)

Standards and Specifications on Flour Fortification

Premix

Kazakhstan

- Vitamin and mineral additive KAP Komplex 1: TU 70 00 RK 39309831-ZAO-025-2002 (Committee on Standardization, Metrology and Certification under the Ministry of Industry and Trade, 1 March 2002, ref. no. 022/001453)
- Vitamin and mineral additive KAP Komplex 1: ST TOO 40261271-01-2006 (Standard of industry, 27 April 2006, ref. no. 0013)

Kyrgyz Republic

- Vitamin and mineral additive KAP Komplex 1: TU 9352 PT 020007157 001-2002 (Technical Committee 09 Grain and its processing products, 20 January 2004)

Mongolia

- Vitamin and mineral additive KAP Komplex 1: MNS 5154:2002 (National Centre on Standardization and Metrology, 30 May 2002,

ref. no. 26, MNS 5154:2003 amended on 1 May 2003, ref. no. 12)

Tajikistan

- Vitamin and mineral additive KAP Komplex 1. Specifications: TU 9352 RT 020007157 001-2002 (Agency on Standardization, Metrology, Certification and Trade Inspection, 7 January 2003)

Uzbekistan

- Vitamin and mineral additive for enrichment of the baking wheat flour. General specifications: O'z DSt 1098:2006 (Agency on Standardization, Metrology and Certification, 6 March 2006, ref. no. 05-07)

Production of Fortified Wheat Flour

Kazakhstan

- Wheat baking flour enriched with the vitamin and mineral additive KAP Komplex 1: TU 70 00 RK 39309831-ZAO-026-2002 (Committee on Standardization, Metrology and Certification under the Ministry of Industry and Trade, 1 March 2002, ref. no. 022/001453)
- Wheat flour. General specifications: ST RK 1482-2005 (Committee on Standardization, Metrology and Certification under the Ministry of Industry and Trade, 28 December 2005, ref. no. 498)
- Wheat flour enriched with the vitamin and mineral additive KAP Komplex 1: ST TOO 40261271-02-2006 (Standard of industry, 27 April 2006, ref. no. 0014)

Kyrgyz Republic

- Wheat baking flour enriched with the vitamin-mineral or mineral additive: TU 9293-002-05712834-2002 (State Inspection on Standardization and Metrology, 16 May 2002, ref. no. 146/490544)
- Wheat baking flour enriched with the vitamin-mineral or mineral additive: KMS 918:2004 (State Inspection on Standardization and Metrology, 6 February 2004, ref. no. 9-ST)

- Wheat common flour. General specifications: KMS 990:2005 (National Institute of Standards and Metrology, 30 December 2005, ref. no. 105-ST)

Mongolia

- Wheat flour enriched with the vitamin and mineral additive KAP Kompleks 1: MNS 5156:2002 (National Centre on Standardization and Metrology, 30 May 2002, ref. no. 26, MNS 5156:2003 amended on 1 May 2003, ref. no. 12). Amendment from 21 December 2006, ref. no. 47 indicated the requirement of use of Healthy Food logo.

Tajikistan

- Wheat baking flour enriched with the vitamin-mineral additive (premix). Specifications: ST RT 1057-2004 (Agency on Standardization, Metrology, Certification and Trade Inspection, 14 January 2004, ref. no. 47-ST)

Uzbekistan

- Wheat baking flour enriched with the vitamin-mineral additive KAP Kompleks 1. Specifications: Tsh 8-178-2002 (Agency on Standardization, Metrology and Certification, 23 September 2002, ref. no. 112/004792, amended 10.10.2005 ref. no. 112004792/01)
- Technological instruction on processing of wheat baking flour enriched with the vitamin-mineral additive KAP Kompleks 1: TIUz 8-215-2003 (Technical Committee Bread and Bakery, Uzkhleboproduct Ltd., 14 March 2003)
- Wheat baking flour enriched with the vitamin-mineral additive KAP Kompleks 1. Specifications: O'z DSt 1098:2006 (Agency on Standardization, Metrology and Certification, 10 April 2006, ref. no. 05-10)

Bread and Bakery Production with Fortified Wheat Flour

Kazakhstan

- Bread and bakery enriched with the vitamin and mineral additive KAP Kompleks 1: TU 70 00 RK 39309831-ZAO-028-2002 (Committee

on Standardization, Metrology and Certification under the Ministry of Industry and Trade, 18 September 2002, ref. no. 022/001643)

- Standard of industry: Bread and bakery with fortified wheat flour: ST TOO 40261271-07-2006 (17 May 2006, ref. no. 0103)

Kyrgyz Republic

- Bakery with fortified wheat flour enriched with the vitamin-mineral, protein, and other food additives: KMS 922:2004 (National Institute of Standards and Metrology, 23 December 2004, ref. no. 39-ST)

Mongolia

- Bread and bakery with wheat flour enriched with the vitamin and mineral additive KAP Kompleks 1: MNS 5384:2004 (National Centre on Standardization and Metrology, 1 December 2004, ref. no. 38)

Tajikistan

- Bread and bakery with flour enriched with the vitamin-mineral additive (premix). Specifications: ST RT 1058-2004 (Agency on Standardization, Metrology, Certification and Trade Inspection, 14 January 2004, ref. no. 47-ST)

Quality Assurance and Control at Industrial Sites

Kyrgyz Republic

- Wheat baking flour enriched with the vitamin-mineral or mineral additive: TU 9293-002-05712834-2002 (State Inspection on Standardization and Metrology, 16 May 2002, ref. no. 146/490544)
- Wheat baking flour enriched with the vitamin-mineral or mineral additive: KMS 918:2004 (State Inspection on Standardization and Metrology, 6 February 2004, ref. no. 9-ST)

Mongolia

- Methods of test of vitamin and mineral additive KAP Kompleks 1: MNS 5155:2002 (National Centre on Standardization and Metrology,

30 May 2002, ref. no. 26, amended on 7 July 2003, ref. no. 31)

- Methods of test of wheat flour enriched with the vitamin and mineral additive KAP Komplex 1: MNS 5157:2002 (National Centre on Standardization and Metrology, 30 May 2002, ref. no. 26, MNS 5157:2003 amended on 7 July 2003, ref. no. 31)

Uzbekistan

- Methods of test of Vitamin B fraction: O'z DSt 1095:2006 (Agency on Standardization, Metrology and Certification, 10 April 2006, ref. no. 05-10)

APPENDIX 6

Declaration of the Third Almaty Forum, 2007

Making Food Fortification Sustainable

29–30 October 2007, Almaty, Kazakhstan

Declaration

1. In 2001, four Central Asian countries – Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan—and Mongolia embarked on a set of ambitious national goals to ensure access to affordable, safe, and efficacious fortified food as a permanent commitment to eliminate micronutrient deficiencies in their populations, and the Asian Development Bank, the United Nations Children's Fund, and the Kazakh Academy of Nutrition, funded by the Government of Japan through the Japan Fund for Poverty Reduction started close collaboration in support of these goals.

2. At the Almaty Forum 2001, multisector delegations led by high-level ministerial officials promised to work together to fortify all salt for human consumption with potassium iodate and fortify wheat flour to the maximum achievable extent with micronutrients using the KAP complex formula. A regional roundtable reviewed the progress being made toward these pledges at the Almaty Forum 2004 and agreed to a detailed work plan to tackle the immediate shortfalls. In recognition that universal salt iodization and mandatory fortification contribute to sustainable elimination of micronutrient deficiencies, multisector delegations from the participating countries have once again gathered at the Almaty Forum 2007 to take stock of the achievements, to analyze the challenges that are still remaining, and pledge to complete the national fortification agendas.

3. A significant progress has been made in increasing the production, sales, and consumption of quality iodized salt guided adoption and implementation of appropriate legal frameworks. Flour fortification

also has been steadily expanding, but still lacks legal and regulatory frameworks to provide a level playing field for all mills.

4. On the basis of national and regional experience and lessons learned during the last six years we recognize that:

- (i) In many countries of the region, the nutrition status of many women and children continues to be poor with negative health consequences for children, families, and constraining economic and social development;
- (ii) Iodine deficiency in pregnancy permanently damages the learning capacity of children;
- (iii) Iron deficiency causes serious damages including poorer pregnancy outcomes, permanent impairment of cognition in early childhood; poor school performance of children and teenagers; reduced work capacity among adults, and increased morbidity from infectious diseases and increased risk of heavy metal poisoning in contaminated environments;
- (iv) Zinc deficiency is associated with lowered immunity to infectious disease, slower child growth;
- (v) Folic acid deficiency in women, who become pregnant, contributes to congenital abnormalities of the central nervous system of the newborn and is an independent risk factor for coronary heart disease;
- (vi) The key B-vitamins, thiamin, riboflavin, and niacin are removed from wheat during flour milling along with most iron and folic acid. This contributes to micronutrient malnutrition among populations who consume large amounts of bread and other flour-based foods;
- (vii) Given the seriousness of the health effects of these micronutrient deficiencies, they must be eliminated as a public health problem.

5. This roundtable strongly reaffirms the goals of appropriate universal fortification of salt and wheat flours.

6. Recognizing that the progress will vary among countries and between salt and wheat, it will be necessary to use country specific interim benchmarks to measure progress toward these goals. Goals and benchmarks are essential and must be used to accelerate progress toward these goals.

Essential Recommended Actions at the National Level

- (i) All countries will anchor food fortification strategies as an integral part of their national development plans and national budget to ensure sustained commitment at the highest political level.
- (ii) All countries will strengthen an effective national alliance for salt and flour fortification among government, industry, academia, and producers.
- (iii) All countries will complete the legislation and regulations requiring flour fortification.
- (iv) The Kyrgyz Republic, Tajikistan, and Uzbekistan will complete the establishment of an effective and high quality system for quality control and assurance of fortified salt and flour.

- (v) All countries will ensure that imported fortified foods meet national standards.
- (vi) All countries will remove barriers to procurement of fortificants and equipment for fortification recognizing achievements of Kazakhstan and the Kyrgyz Republic.
- (vii) All countries will assure that the importance and safety of consuming fortified salt and wheat products is understood at all levels of society.
- (viii) All countries will continue to strengthen inter-country collaboration through existing mechanisms of communication to make optimal use of expertise and experience, to harmonize standards, strengthen quality assurance, remove impediments to trade in fortified foods, and create economy of scale for food fortification inputs such as premix.
- (ix) All countries will ensure regular meetings to report on progress and renew political commitments to the food fortification goals.
- (x) All countries will establish a national fortified food surveillance system and report on fortified food supply, consumption, and biological outcome.
- (xi) Governments and parliaments should set aside adequate funds in their central budgets to finance activities required for sustaining universal salt iodization and flour fortification

Asian Development Bank

Nutrition and Development Series

1. Investing in Child Nutrition in Asia. Joseph Hunt and M.G. Quibria (eds.). Asian Development Review Vol. 17 Nos. 1 and 2, 1999.
2. Manila Forum 2000. Strategies to Fortify Essential Foods in Asia and the Pacific. Asian Development Bank, Manila; Micronutrient Initiative, Ottawa; and International Life Sciences Institute, Washington DC, 2000.
3. Improving Child Nutrition in Asia. John Mason, Joseph Hunt, David Parker, and Urban Jonsson. Food and Nutrition Bulletin Special Supplement, September 2001.
4. Attacking the Double Burden of Malnutrition in Asia and the Pacific. Stuart Gillespie and Lawrence Haddad. Asian Development Bank, Manila; and International Food Policy Research Institute, Washington DC, 2001.
5. What Works? A Review of the Efficacy and Effectiveness of Nutrition Interventions. Lindsay H. Allen and Stuart R. Gillespie. Asian Development Bank, Manila; and United Nations Sub-Committee on Nutrition, Geneva, ACC/SCN Nutrition Policy Paper No. 19, September 2001.
6. The Nutrition Transition and Prevention of Diet-related Chronic Diseases in Asia and the Pacific. Barry Popkin, Susan Horton, and Soowon Kim. Food and Nutrition Bulletin Special Supplement, December 2001.
7. Food Fortification in Asia: Improving Health and Building Economies. An Investors Primer, Summarizing Investment Plans for Five Asian Countries. Developed by the Governments of Indonesia, Pakistan, the People's Republic of China, Thailand, and Viet Nam, with assistance from the Asian Development Bank and the Keystone Center. November 2003.
8. Satisfying Hidden Hunger: Addressing Micronutrient Deficiencies in Central Asia. Asian Development Bank, Manila. 2010.

Nutrition and Development Series

Disease caused by major micronutrient deficiencies posed a growing and urgent problem for the newly emerging countries of Central Asia in the 1990s. The Asian Development Bank responded with a regional food fortification initiative—the first major initiative using public–private partnerships to address public health problems in the region. This report details how the initiative helped the participating countries move toward universal salt iodization and establish sustainable wheat flour fortification, and how the initiative successfully addressed three unknown development issues in mainly newly emerging market economies: the use of public–private partnerships; collaboration between the government and industry; and the formation of industry associations.

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